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ART. XXI.—ON CANTHARIS VESICATORIA.

By Robert Coulton Davis.

An Inaugural Essay.

CANTHARIS, U. S.

Cantharis *vesicatoria.*—*Class,* Insecta; *Order,* Coleoptera; *Family,* Trachelides; *Tribe,* Cantharideæ.

Physical Characters of the genus Cantharis.—Tarsi entire; nails bifid; head cordiform, not produced into a rostrum; thorax narrower than the upper part of the head, nearly square, but attenuated in the anterior part; elytra flexible, covering the whole abdomen, linear and cylindrical; wings perfect; maxillæ with two membranous lacinæ, the internal one acute within, subarcuate; maxillari palpi larger at tip; antennæ longer than the head and thorax, rectilinear, first joint longest, the second transverse, and very short.

This species has been often miscalled *Meloe,* but from which it is easily distinguished by the form of the head and antennæ, which in the Cantharis is cordiform, whilst that of the preceding is nearly square; and also by the absolute want of wings, and the linear and semi-cylindrical wing cases of the Cantharis.

The *Cantharis vesicatoria,* is about two-thirds of an inch in length, and one-fourth of an inch in breadth, of oblong shape, and of a brilliant green, golden red, or copper colour,

with very long and flexible wing sheaths, marked by three longitudinal stripes, covering very thin membraneous transparent wings. The head is surmounted by several jointed antennæ.

Natural History.

This class of insects is a native of the continent of Europe, and the West of Asia. They are much more abundant in those countries which lie nearer the equator, than those which are farther north, and are possessed of much greater vesicating properties.

We derive most of our supply from Spain, Italy, and the South of France. Considerable quantities are also exported to St. Petersburg, from the southern parts of Russia, but which rarely, if ever, reach this continent. They may be easily distinguished from the former by their larger size, and their color approaching to that of copper.

Cantharides are generally gathered during the months of May and June, on the privet, ash, elder, lilac, white poplar, and a species of honey-suckle, in Spain, Italy, and France. The retreat of this insect is easily discovered, by reason of the peculiarly strong and fetid odor which fills the atmosphere for a great distance around, which is exceedingly offensive, and can be only compared to that of mice. Such numbers are sometimes congregated together in the air, that they appear like swarms of bees. The time appointed for their collection is in the morning before sunrise, on account of their being readily shaken from the trees, owing to their torpid state, caused by the coldness of the preceding night; or they may be taken by smoking the trees with the fumes of burning sulphur, previously spreading a cloth beneath the trees to collect them in.

The persons who gather them have their faces masked, and their hands covered by thick gloves. They are then packed, (previously being exposed to the vapor of boiling vinegar to destroy vitality, and carefully and thoroughly

dried in the sun, or in rooms heated by stoves for that purpose) in nearly air-tight cases lined with paper, to exclude as much as possible the atmospheric moisture.

Properties.

When exposed to moisture, cantharides speedily undergo decomposition, and are thus nearly, if not wholly unfit for use. If cantharides have been properly dried and kept in well stoppered bottles, they remain unchanged both in appearance and in color, and retain their vesicating properties unimpaired for a great length of time. A case is upon record of their being kept in this manner for thirty years. Sometimes, in spite of every precaution to preserve them, they will be attacked by a very small worm which preys upon and destroys the inner and softer parts of the body, while the harder portions remain untouched. It was for a long time thought that the part destroyed was totally unproductive of vesication, and that the remainder alone contained the virtues, but which has been satisfactorily proved to be incorrect. Various methods have been devised to destroy this insect, viz. by camphor, acetic acid, and by placing the bottle containing the infected flies in water, (which must be raised to the boiling point,) which destroys both the worm and the egg without injuring in the least the virtues or the appearance of the flies; the access of water to them must be carefully avoided. The Spanish flies, when dried, retain the color and the disagreeable odor to a great degree as in the living state. These, when first taken into the mouth, have a bitter taste, but upon being chewed become exceedingly burning and acrid. The powder is of a dark brown, bordering on a grayish color, interspersed with numerous shining particles, consisting principally of the head, wing cases, and of the legs. The golden red or green color should never be considered as a test of its superiority, as it is very permanent, scarcely being acted upon by boiling water, ether, alcohol, the essential or

fixed oils. The active principle itself may indeed be entirely extracted, without even injuring the color.

Cantharides should not as a general rule be purchased in powder, except when entire confidence is placed in the vender; and then it is important to ascertain that they have been recently reduced to that state.

Analysis.

Various attempts to analyze cantharides were made by many chemists, but no very satisfactory results were obtained, until the subject was taken up by Robiquet in 1810. After an elaborate analysis, he found them to contain the following constituents, viz. 1. A green oil, insoluble in water, but soluble in alcohol and inert as a vesicatory. 2. A black matter soluble in water, insoluble in alcohol, and inert. 3. A yellow viscid matter soluble in alcohol and water, likewise inert. 4. Cantharidin. 5. A fatty matter insoluble in alcohol. 6. Phosphates of lime and magnesia, acetic acid, and, in the recent state, a small quantity of uric acid.

Orfila has since discovered a volatile principle, upon which the peculiar disagreeable odor of the fly depends. It is separable by distillation with water.

Cantharidin, the substance on which the blistering property depends, is prepared by boiling cantharides in water until every thing soluble in that liquid is taken up; then evaporate to the consistence of a thick syrup, and boil it continually in alcohol until that liquid ceases to act upon it; evaporate the solution thus obtained to dryness over a water bath, and put the residue in a well-stoppered bottle containing ether, and shake the mixture for a considerable time. The ether at first will seem not to be effected by it, but after a few hours it will assume a beautiful yellow color. Then separate the solution from the precipitate by decantation, and allow it to evaporate spontaneously in a dry atmosphere. After evaporation, the result will be found

to be cantharidin, in small crystalline scales, mixed with a yellow substance which is readily dissolved by alcohol, taking up this coloring principle, but which does not affect the cantharidin. These crystals are then to be dried between the folds of bibulous paper. Cantharidin, when pure, is insoluble in water or cold alcohol, but it is soluble in boiling alcohol, (which precipitates on cooling,) ether, and the oils. It is capable of being fused and volatilized by heat without decomposition, the condensed vapor being composed of acicular crystals.

A small quantity of cantharidin prepared by the writer, by the above process, and dissolved in olive oil, produced vesication in about two hours. An aqueous extract, made by boiling the flies in water for a few hours, filtering and evaporating over a water bath, caused the same effect in six hours.

A quantity of cantharides was digested in spirits turpentine for twenty-hours, and prepared in the same manner as above, to produce an extract. This extract was applied to the writer's arm, and in less than three hours the surface to which it was applied was in a complete state of vesication, attended with much pain, and which did not entirely heal for the space of ten days.

A tincture of cantharides made with ether, and also one with spirits of turpentine, when suffered to evaporate spontaneously, will leave a crystalline mass, which is no doubt cantharadin, as this will vesicate in about the same time as that of cantharidin with oil.

Passing from the general history of the *Cantharis vesicatoria*, its natural history, &c., I purpose making a few remarks principally on a few pharmaceutical preparations of it, with some observations upon the blistering cerate of the shops.

It is the generally received opinion, that cantharides are injured, as regards their vesicating properties, by a high or protracted heat in the preparation of the Cerat. Cantharidis.

This opinion has recently been the subject of doubt. Some of our most accurate and scientific pharmaceutists have been led, as the result of careful experiments, to believe that far too much importance has been attached to the degree of heat that may be safely used in its preparation. Without intending to assert a contrary opinion, it is a subject of so much importance, that repeated experiments should be made, and repeated trials to test the certainty of those experiments, where a long established usage is about to be changed. The theory that a solution of cantharidin is effected by the higher degree of heat used, which, when combined with the wax and resin, will form a more active vesicating ointment, is plausible; but my own experiments have not been attended with that result. After a careful trial of this new method of making the cerate, in which its activity was decidedly injured, and a similar result having occurred in one other instance, I am induced to believe that the risk of lessening instead of increasing the vesicating quality of the ointment is greater than any advantage that will be likely to result in deviating from the formula of the U. S. Pharmacopœia. It is possible that by the use of a water bath, and very great care, this injury may not occur; but every apothecary knows that the health, if not the life, of a fellow-being may depend upon the efficacy of a blister; and that his own reputation, if not that of the physician who reposes confidence in his skill, may be injuriously affected by inertness in that among other remedies which he is called upon to prepare. He feels, therefore, the responsibility that rests upon him, as well in adopting any proposed change as in the necessity of insuring certainty and uniformity in the strength of this important therapeutical agent. As expense should not be regarded in attaining this object, I will offer the following formula to those who may feel inclined to vary from the excellent authority of our national Pharmacopœia. It will be perceived that it is a combination of the two methods. If any

advantage is likely to arise from the separation of the cantharidin, it will be attained by its incorporation in the form now proposed, at the same time that we shall incur no risk of diminution in strength by a deviation from long tried experience.

Take of Cantharides in fine powder,	℥xij.
Resin, Yellow Wax, Lard, of each	℥viij.
Ft. Ung. S. A.	

Take of Cantharides Pulv.,	℥vj.
Spt. of Turpentine,	℥iij.
Olive Oil,	℥iv. M.

Simmer over a slow fire for two hours; raise the temperature gradually to the boiling point; filter and evaporate over a water-bath until all the spts. turpentine is driven off; then thoroughly incorporate this solution with the cerate, immediately after the flies have been added, stirring continually until cool. The object of adding the spts. turpentine is for the purpose of more effectually dissolving the cantharidin, and the peculiar volatility of this article affords ready means of getting rid of it, after it has performed this function.

Several other cerates have been proposed for the officinal cerate; one of which directs to make a saturated decoction of flies in olive oil, by heat, straining and adding a sufficient quantity of wax to render it of a proper consistence; and another is, to make an etherial extract of cantharides, and add twice the same quantity of wax: but neither of these will be likely to supersede the above cerate.

Various complaints have been made by physicians and their patients of the inefficacy of blisters, which are very embarrassing to the apothecary, especially when he is confident that the cerate has been prepared with great care, and that the cantharides used were of the first quality. Having devoted much attention to the matter, I have found that the principal reason of failures consists, in a great mea-

sure, upon the porous matter upon which the cerate is spread, viz.: sheep-skin, chamois-skin, muslin, linen, &c. The experience of others, as well as of myself, has taught me that the best method is to spread the cerate upon adhesive plaster cloth, oiled silk, and sheet gum elastic; but this last mode is rather too expensive. The former is attended with much less expense than sheep-skin, and prevents the absorption of the cantharidin, which is dissolved in the oil, and which, of course, is necessary to produce the desired result.

It is sometimes the practice, after spreading the blister, to spread upon its surface a small quantity of powdered cantharides, to insure the certainty of vesication; but this is unnecessary, especially if proper care has been used in preparing the cerate, and the flies used are of the first quality. It should be particularly impressed upon the mind of the apothecary, that he cannot exert too much scrutiny in the selection and in the manufacture of the various preparations of cantharides, as upon these often wholly depends not only the continuance of the life of a fellow being, but the reputation of both himself and of the physician.

ART. XXII.—ON PREPARED IRON.

To the Editors of the Journal of Pharmacy.

GENTLEMEN:—Having been led, by some remarks made by Professor Meigs on the subject of anæmia, to examine M. A. Raciborski's work, entitled "De la Puberte et de l'Age Critique Cher la Femme, &c.," I found that he recommended a number of the preparations of iron, but spoke more decidedly in favor of a preparation of pure metallic iron; as it proved, in his hands, much more successful than any other of the preparations, from its perfect insipidity, and from some peculiar inherent power. At p. 253, he says that "MM. Quevenne and Miquelard, who recommend the employment of iron thus obtained, regard it as combining the two advantages most sought after in ferruginous medication: very great activity, and absolute insipidity." Also, at p. 272, after referring to the lactate of iron, as prepared by M. Gelis at La Charité, that he "prefers the metallic iron, as prepared by the method of MM. Quevenne and Miquelard, as it has the immense advantage of being entirely insipid; and from this circumstance may be readily administered in any form: for this reason we have employed it for two years past almost exclusively, and always with complete success." It consists of metallic iron in a perfectly impalpable state; being a blackish powder, with a slight metallic lustre, and without odor or taste. It has a strong affinity for oxygen, and, from this circumstance, should be kept in a dry place, and in a glass bottle, with an air-tight stopper. It is prepared by placing a small portion of any of the oxides of iron (the higher oxides are most easily reduced) in a gun-barrel, and passing hydrogen over it when heated to a low red-heat. To reduce it perfectly, the process should be continued for some time. The oxygen of the iron unites with the hydrogen and forms water, which is

driven off in the form of vapor; and the process must be continued until moisture ceases to be given off, which may be tested by holding a smooth polished surface of metal or glass at the farther extremity of the barrel. The gun-barrel should be closed at both ends by a cork, through which at one end an escape tube of glass or metal is passed, and at the other, the tube leading from the gas generator. It is necessary to observe the test, as to the escape of vapor, to insure the perfect reduction of the oxide of iron.

It may also be prepared by precipitating the protosulphate of iron in solution with oxalic acid. To a saturated clear solution of two parts of crystallized copperas, add one part of crystallized and pulverized oxalic acid, with constant stirring, until the whole assumes a yellow color; after standing a short time, stir again, and set it aside for twenty-four hours. The yellow oxalate is then filtered off, dried, and exposed to a red heat in a crucible, when the oxalic acid, by decomposition, carries off the oxygen of the iron, leaving it in a finely divided metallic state. $Fe\ O + C_2\ O_3 = Fe + 2C\ C_2$. With a lower heat the oxalate will still decompose, but then the iron is so finely divided, that when poured through the air, even if cold, it attracts oxygen so rapidly as to take fire, and burn to red oxide. The same may take place with the iron reduced by hydrogen, if the operation be conducted at too low a temperature.

M. A. Raciborski ascribes its activity to the fact that it more easily combines with the acids with which it comes in contact in the stomach, and is thus sooner conveyed into the circulation.

It may be administered in almost any form. MM. Quevenne and Miquelard recommend its administration in the forms of pastilles, made with chocolate, sugar, and gum; and remark, that when thus mixed, they present no peculiar appearance, and their taste differs so little from that of ordinary chocolate, that it is necessary to have the attention

drawn to the iron in order to perceive it. From six to twelve of these are prescribed in the course of a day. It may also be given mixed with bread.

Yours, with respect,

ALEXANDER H. HOFF.

ART. XXIII.—ON THE DECOMPOSITION OF CARBONIC ACID AND THE ALKALINE CARBONATES BY THE LIGHT OF THE SUN.

By JOHN W. DRAPER, M. D., Professor in the University of New York City.

FOR many years it has been known that the green parts of plants, under the influence of the sunlight, possess the power of decomposing carbonic acid and setting free its oxygen. It is remarkable that this, which is a fundamental fact in vegetable physiology, should not have been investigated in an accurate manner. It is not known that any one has yet attempted an analysis of the phenomenon by the aid of the prism, the only way in which it can be truly discussed.

It is the object of Prof. D.'s paper to prove, 1st. That the light of the sun is the true cause of the decomposition, the rays of heat and the so-called "chemical rays" not participating therein, as Graham, Johnston, and other writers on vegetable chemistry suppose. 2d. That it is the yellow light, or most luminous ray, that is mainly concerned. 3d. That leaves evolve not pure oxygen gas, but a mixture of oxygen and nitrogen in regulated proportions. 4th. That there is an extensive class of salts which is decomposed under the same circumstances, and therefore the phenomenon is rather to be attributed to a digestive than to a respi-

ratory process. 5th. That this digestion is brought about in the same way as the digestion of animals, by the decay of a nitrogenized body.

To show that the light of the sun is the cause of the decomposition, having obtained a motionless spectrum by the aid of a heliostat, he placed in the different colored spaces tubes filled with water impregnated with carbonic acid gas, and containing some leaves of grass. The decomposition presently commenced, and in the course of two hours a sufficient quantity of gas was collected. On examination, it was found that the tubes in the yellow, the orange, and the green light, contained most gas; that in the red, a much smaller quantity; and those in the blue, the indigo, and the violet, none at all.

But the maximum of heat occurs in or beyond the red ray; the maximum of chemical action among the more refrangible colors, blue, indigo, and violet; and in these spaces the decomposition of the acid fails to go on.

From this he infers that it is the light of the sun, and the yellow light mainly, that is the cause of the phenomenon.

On causing leaves to decompose carbonic acid in water by the rays of the sun, and collecting the gas as it is evolved, it appears on no occasion to be pure oxygen, but a mixture of oxygen and nitrogen in variable proportions; from fifty to ninety per cent. of oxygen being found at different times, as is shown by explosion with hydrogen gas. But although there is this great variability in the proportion of the two gases evolved, a very simple law, which directs the progress of the decomposition, may be traced. On causing leaves to decompose a known volume of carbonic acid, the same volume of the mixed oxygen and nitrogen makes its appearance. From this it is to be inferred, that plants during this action do not only effect the fixation of carbon, as is commonly supposed, but with it they absorb a certain amount of oxygen also. When a leaf, exposed in carbonic

acid gas to the sunshine, has completed its function, it has appropriated or assimilated all the carbon, and with it a certain portion of the oxygen; the residue of the oxygen has been evolved, and with it a volume of nitrogen precisely equal in amount to the volume of oxygen appropriated by the plant.

This disappearance of oxygen and appearance of nitrogen are thus connected with each other: they are equivalent phenomena.

The emission of nitrogen is not a mere accidental result, but is profoundly connected with the whole physiological phenomena.

The elementary conditions under which carbonic acid gas is decomposed having been thus stated, Prof. D. passed next to the description of similar decomposition occurring in the case of saline bodies. It has always been a subject of surprise to chemists, that the powerful affinity by which carbon and oxygen are thus held together, should be so easily overcome at common temperatures. Even potassium cannot decompose carbonic acid in the cold. It might therefore be reasonably expected, that the energetic forces which bring about this change ought also to effect other remarkable decompositions. In fact the decomposition of carbonic acid is only one of a very numerous series.

Having boiled some distilled water to expel all gaseous matter, dissolve in it a small quantity of bicarbonate of soda. Introduce into a test tube some leaves of grass, fill the tube with the saline solution, which has been once more boiled to expel any air it may have obtained from the dissolving salt, and invert the tube in some of the solution in a wine glass, after having carefully removed all adhering bubbles of air from the leaves by a piece of wire, or in any other convenient manner. This arrangement, kept in the dark, undergoes no change; but if brought into the sunshine, bubbles of gas are rapidly evolved, and in the course of a

few hours the tube becomes half full. On detonation with hydrogen, this gas proves to be rich in oxygen.

Prof. D. made some attempts to discover how much oxygen could in this way be evolved from known quantities of bicarbonate of soda; supposing it probable that the second atom of carbonic acid being removed and decomposed, the process would cease: however, the results of his experiments indicated that the supposition he had formed was not correct. The process is not limited to the removal and decomposition of the second atom, but goes forward, the first itself being in like manner decomposed. From this it would seem that carbonate of soda itself should be decomposed; and experiment verified the conclusion: for on using that salt instead of the bicarbonate, the evolution of oxygen went on precisely in the same way.

As in these experiments a solid salt is decomposed, it is obvious that the function by which the leaves accomplish this is very different from that of respiration. It is not respiration, but a true digestion.

In the same way Prof. D. found that all kinds of soluble carbonates and several other organic salts, such as bitartrate of potash, citrate of soda, succinate of ammonia, &c., would emit oxygen.

It thus seems that the decay of some nitrogenized body in the leaf is essential to the digestive action of plants.

At this stage of the inquiry, a remarkable analogy appears between the function of digestion in animals and the same function in plants. Liebig has shown how, from the transformation of the tissues of the stomach itself, food becomes acted upon, and is turned into chyle, an obscure species of fermentation brought about by the decay of nitrogenized bodies. So in like manner in plants; the dissolution of a nitrogenized body brings about the assimilation of carbon. The facts seem to indicate, that the primary action of the light is not upon the carbonic acid, but upon

the nitrogenized ferment; and that the decomposition of the gas occurs as a secondary result. From this we may infer that chlorophyll, the green coloring matter of leaves, is the body which in vegetables answers to the chyle of animals; that it is derived from the decomposed carbonic acid through the eremacausis of albumen brought into the leaf, or of some compound of the elements of ammonia that passes up by the route of the ascending sap; and that the oxygen which disappears, disappears to bring about the eremacausis of that ferment. Under this point of view, the digestion of plants may be regarded as taking place in the following way:—There is introduced into the leaf some azotized body formed by the aid of ammonia that has passed through the spongioles: on this the sunlight acts, bringing about its decomposition by causing its union with oxygen: and now, if carbonic acid be present, the decomposition is propagated to its atoms; a part of the oxygen set free is expended in continuing the eremacausis of the ferment; the rest is evolved with an equivalent volume of nitrogen. The carbon thus set free unites at once with the elements of water, and chlorophyll results. But this chlorophyll undergoes continuous change under the action of the sun, and is as continually replaced; from it is formed gum, and finally lignin, and all the woody fibre of plants must have originally existed as chlorophyll, or passed through the green stage.

Proceedings of the American Philosophical Society.

ART. XXIV.—ON THE DOUBLE SALTS OF IRON.

By Mr. Hemingway.

In case 1, hydrated sesquioxide of iron was added to a boiling and concentrated solution of citric acid: it was observed to dissolve readily and in large quantity up to a certain point. A further addition left the solution turbid, apparently from excess of oxide. The mixture was now suffered to cool, was then filtered, evaporated to a treacly consistence, and dried in thin layers on well glazed earthenware: it separated in lamellæ of an acicular form and garnet color, scarcely soluble in cold water, but more readily in hot. Fifty grains of this salt, dried at 212°, were examined as to the quantity of oxide contained; it yielded fourteen grains =28 per cent. Another portion, prepared after the same manner, yielded fifteen grains=30 per cent.

In case 2, two several quantities of citric acid and hydrated sesquioxide of iron were kept at a temperature just sufficient to influence to combination until chemical action had ceased. The solutions were filtered, reduced, and dried, as in case 1. The salts separated in lamellæ, but of a short and broad sort. These were in like manner submitted to examination, when there were found in one 22 grains of oxide, and in the other 25 grains of oxide, per cent.

In case 3, I proceeded as in case 1, until the whole of the oxide derived by precipitation from four parts and a half of commercial sesquioxide had been added to five parts and a half of crystallized citric acid, and gentle ebullition was continued for fifteen or twenty minutes. In appearance much of the oxide remained unchanged; but it was evidently in combination, for on the addition of an alkali, it was totally and instantly dissolved. Owing to the variable quantity of real oxide existing in the article sold in the

shops, this experiment will not be uniformly successful. From an experiment which will be detailed in a subsequent part of this paper, this combination of oxide of iron and citric acid will be inferred to be in the ratio of 80 to 140, or of one equivalent of oxide of iron to two equivalents of crystallized citric acid.

In case 4, tartaric acid was substituted for citric, and subjected to the same treatment as described in case 1. As soon as the solution appeared turbid, one-half was removed, filtered, and dried at 212°, when one hundred grains were found to be impregnated with twenty-six grains of sesquioxide of iron. I did not repeat this experiment. To the remaining half, more oxide was added, and during the continuance of this part of the operation, a bulky hydrated bitartrate of iron was thrown down, very nearly resembling hydrated sesquioxide of iron, but differing in being totally soluble in alkalies. This precipitate was well washed, and dried at a gentle heat, which was raised towards the close of the process to 212°, and there kept until it ceased to lose in weight. One hundred grains were then heated to redness; it first evolved a suffocating inflammable vapor, then charred, and finally left me thirty-seven and a half grains of residue; the residue was dissolved in nitro-hydrochloric acid, precipitated with caustic ammonia, and washed. It was again heated to redness, when there were found to be thirty-six grains nearly.*

In case 5, acetic acid was digested at a common temperature with the hydrated oxide; union was readily effected, and by adding a little alcohol, and filtering, a beautiful solution was obtained, which, after the lapse of months, had only a very trifling deposit. A quantity of this solution was left to spontaneous evaporation in divided portions of say half an ounce each; the great bulk suffered decomposition

* It is stated in *Rose's Manual of Analytical Chemistry*, that ammonia completely precipitates sesquioxide of iron from its solution in aqua regia; an impression is now gaining ground that such a statement is inaccurate.

in drying, and I only obtained from a pint of solution about one scruple in a perfect state, and about as much more in a slightly imperfect* condition. The perfect salt is in lamellæ of a ruby color, and is soluble in water; ammonia precipitates oxide of iron from its solution, and the affinity between the oxide and acid is so trivial, that a little elevation of temperature is sufficient to overbalance it; in its dry state it will bear considerable heat without alteration; before examination, I held it some minutes very near to a common fire. The twenty grains of *slightly* imperfect salt were made up to twenty-five, and heated to redness; after fifteen minutes it was found to weigh eight grains: the remainder was preserved, as I did not like to part with the very little that was with difficulty obtained.

It appears to me that the nature of the precipitate soluble in alkalies, spoken of in cases 3 and 4, has been mistaken, and that they have been confounded with the oxide of iron itself. I some while ago met with an observation, but have failed to discover it since, to this effect—"The further addition of oxide (meaning addition after solution had ceased) causes the separation even of that portion which had been previously dissolved." A writer in the Pharmaceutical Journal, vol. i. p. 595, says, "Let the oxide be added in excess." M. Beral also directs that "rather more oxide should be added than the acid will dissolve." Whatever may be the value of these remarks, or how much they may conflict with each other, it is not my present business to inquire; I refer to them, because individually, and together, they do seem to imply that the fact of the oxide combining after solution had ceased, has been overlooked; and possibly to the prevalence of this oversight we may attribute much of the erroneous impression which so generally obtains. On a further comparison, I find that more of these

* The imperfection consisted in minute opaque dull spots, arising from disengagement of acetic acid and deposition of oxide.

results are not coincident with the opinions of some others: the writer in the Pharmaceutical Journal, to whose paper I have alluded, after a description of M. Beral's process, has the following—"The oxide of iron and citric acid combine in the proportion of forty parts of the oxide to seventy of the crystallized acid." The same is repeated by Dr. A. T. Thomson, in the last edition of his work on Materia Medica. I have repeatedly tried, without success, but with some uniformity as to result, to obtain a citrate of iron in scales so constituted; and as these proportions seem more fitly to apply to a compound of a different description, I would respectfully leave to these gentlemen to determine whether some error in computation may not have attended their investigations.

Regarding what has been stated in the preceding cases as matter of evidence, I see not how to escape from the conclusion, that in case 3, and latter part of case 4, we are presented with definite compounds of sesquioxide of iron with citric and tartaric acids; indeed, the constitution of the tartaric acid salts determined theoretically, and by experiment, agreed so very closely as to leave little room for dispute, and with the citric acid salt it is not much more discordant. The combination of the oxide with acetic acid is also to be considered as definite, inasmuch as all acid uncombined must have escaped during the evaporation. The quantity of oxide in twenty-five grains of the dry salt held a few minutes before the fire, was found to be nearly eight grains; but this estimate, owing to causes before mentioned, is a trifle too high: now, by a theoretical computation, a salt composed of four equivalents of acetic acid, and one equivalent of oxide of iron, should contain seven grains (rather more than less) of oxide in the same quantity; which, therefore, is probably the actual constitution of the article in question.

But it may fairly be doubted whether the products of the first and second operations have an equivalent constitution;

the examination did not corroborate such an idea: nevertheless, both a tercitrate and quadricitrate may exist, and the latter supposition gains support from the probability of acetic acid combining in the same proportion.

Sesquioxide of iron is not precipitated from its combination with citric and tartaric acids, by alkalies, alkaloids, earthy and some metallic oxides: according to Professor Brande, malic, mucic, kinic, and pectic acids lead to the same result. It has been found that double salts are formed, the precise constitution of which chemists are by no means agreed on: my own observations induce me to regard a binary series, the existence of which I will endeavor to demonstrate.

I took bicitrate of ammonia, and to its boiling solution added hydrated oxide of iron so long as a *greenish-yellow* color was retained, or so long as a distinct *red* absented itself: the solution must be boiled a few moments after each addition of oxide, or the effect will not be observed: when the process is complete, we have a combination of one equivalent of bicitrate of iron with two equivalents of citrate of ammonia. I obtained from one specimen so made, very nearly twenty-two grains of oxide per cent., and from another twenty-four grains: it dries in scales of a golden color.

Again, I took the precipitated oxide derived from four parts and a half of commercial sesquioxide, and boiled it with five parts and a half of crystallized citric acid, and after continuing ebullition a short time, it was supersaturated with caustic ammonia; it was then filtered, and cooled quickly, and I had a solution most difficult to evaporate without decomposition, but which, when dry, was perfectly soluble: one hundred grains of this salt afforded me nearly thirty-six grains of oxide of iron. I am sorry to say, another gentleman, to whom I gave a portion of this salt, only obtained thirty-four grains: pardon my attaching importance to this circumstance. It was my request that before exami-

nation notice should be taken that the salt was dry, for it is of so deliquescent a nature, that by long keeping, or transferring from one bottle to another, it absorbs water. I was sorry, therefore, to find, by his note to me, that he had tried the salt in the state I sent it to him. It is true, he remarked, that the salt appeared quite dry, but there might have been water, and my impression is, there was, and that his estimate is too low: under these circumstances, I think I am entitled to split the difference, and call it thirty-five.

I submit it to you whether I may not with reason infer that the real constitution of this salt is one equivalent of citrate of iron, and one equivalent of citrate of ammonia; that is,

Sesquioxide of Iron,	80	or	37.56
Citric Acid,	116	"	54.46
Ammonia,	17	"	7.98
Equivalent,	213		100.00

What now forces itself upon the mind—what but the conviction that these two compounds are the representatives of two distinct series of chalybeate salts? I anticipate the objection that I do not show by analysis that my theory is exactly confirmed. It is true, I come only very near the point, but I ask, let it be recollected that these salts are uncrystallizable; that on this account it is most difficult to keep the one series from interfering with the other; and this practical difficulty has been the cause, I think, of the uncertainty of opinion that is current among us. I show two compounds, one containing very nearly one equivalent of oxide of iron united to one equivalent of acid, the other containing one equivalent of oxide of iron united to two equivalents of acid: they have peculiar external characters, and are arrived at by different means. I point out how this "not quite" is to be explained, and I do think that in forming my opinion I have followed closely in the track

of inductive science; I determined to rest the preceding part of my argument on what, with all the correction I have bestowed on it, still remains weak and defective, because, trusting to my formula, I had given to several gentlemen samples of a salt which proved to be less perfect than I have made it at other times. This difficulty, which opposes itself to the establishment of a superseries among citric salts, will not be felt when I come to treat of the analogous compounds with tartaric acid. We have been long familiar with an example of the inferior series of tartaric acid salts in the officinal potassio-tartrate of iron; I therefore shall not now further occupy myself with them. The superseries is made evident in the following manner:—The bitartrate of iron resulting from the operation in case 4 is to be saturated with potash or ammonia; the solution is to be then filtered and carefully dried in small quantities at a time; I found ammoniacal salt to contain thirty-five grains of oxide: estimated theoretically, it is a fraction short of this quantity. Thus—

One equivalent of oxide of iron,	80	or	34.93
Two equivalents of tartaric acid,	132	"	57.64
One equivalent of ammonia,	17	"	7.43
	229		100.00

To one or other of these two series, or to a mixture of both, the whole of the double iron salts, containing the sesquioxide, with which I am acquainted, are capable of being referred. The difficulty attending the manufacture of perfect salts of the superseries, is such as to render it improbable that they can ever become extensively used. The ammonio-citrate of commerce contains an average of thirty per cent. of oxide; and in this state it is more permanent. A salt having this constitution is made without much trouble as follows:*

* The preparation of the hydrated oxide is an important point in the formation of these salts; the London College orders the sesquichloride to be decomposed with caustic potash; the Edinburgh directs the per-

Take a bisalt of any third constituent (bicitrate of ammonia for example) made by adding a known quantity of citric acid to a similar quantity exactly neutralized with ammonia. This solution in its turn is to be saturated with hydrated oxide, which is accomplished by mixing the oxide gradually so long as it continues to be dissolved, avoiding any great excess. This formula admits of very general application by simply changing the acid, or the third constituent, but there are exceptions.

Dr. A. T. Thomson observes on the ammoniacal citrate, that it disagrees with some constitutions more than its congener, the potassio-tartrate. Guided by this opinion, I would direct attention to the compound of tartaric acid, iron, and potash, obtained by dissolving the hydrated bitartrate in a solution of the caustic alkali; if they be mixed

sulphate to be similarly treated with caustic ammonia. My own plan in detail differs from both of these. I make a solution of the sesquichloride according to the directions of the London College, adding nitric acid to insure the complete peroxidation of the iron, but instead of decomposing cold, diluted, and with a caustic alkali, I mix the solutions warm, somewhat concentrated, and use a carbonated alkali, and for these reasons: a moderate degree of heat is favorable to chemical action, and when conjointly with this, double elective affinities are in operation, decomposition is more complete, *and the liability to form a basic salt is considerably diminished.* Again, if the solution is very weak, the precipitate will be of so buoyant a nature that the process of ablution will be tedious. As soon, however, as the oxide is precipitated, longer retention of heat is absolutely mischievous, and large quantities of cold water must be added without delay, and the washing continued until the supernatant liquor is tasteless; the remaining water being drained off, the oxide is ready. To this it has been objected, that carbonic acid has no affinity for sesquioxide of iron. I apprehend that affinity does exist, although ordinarily it does not influence to combination; how else shall we explain the fact that solutions of sesquicarbonate of ammonia and bicarbonate of potash dissolve, under pressure of carbonic acid, sesquioxide of iron? That an affinity exists, I think is manifest; and that it prevents failures in making the hydrated oxide, I am inclined to believe: at all events, I have not formed a basic salt since I have adopted the plan of decomposing with carbonate of ammonia.

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in such proportion as to keep the bitartrate slightly in excess, supersaturating at the end with ammonia, a salt will be obtained perfectly but slowly soluble in cold water, substantially consisting of tartaric acid, iron, and potash, and belonging to the superseries of double salts. The admixture of ammonia is advised, first, because it is impossible to separate any excess of potash, should there be any; and, secondly, because it is difficult to effect complete combination without such excess.

In pursuing this investigation, the present nomenclature of the Pharmacopœia seemed incapable of comprehending the double series which opened itself to view; and on searching for a better, I soon found myself on ground which was occupied by contending parties. The unsettled point consisted in this: Is the iron, or the third constituent, to become the adjective adjunct to the acid? In other words, is a compound of tartaric acid, oxide of iron, and potash, to be called potassio-tartrate of iron or ferro-tartrate of potash? Many, whose names command the greatest respect, continue to make the third constituent express the quality of the acid; and these have custom for their stay. On the other hand, it is contended that this nomenclature conveys erroneous impressions of the constitution of the salt; and the argument is thus summed up by Dr. Pereira in his *Elements of Materia Medica:* "The ferro-tartrate of potash is to be regarded as a double salt, in which tartrate of iron is the acid, or electro-negative ingredient, and tartrate of potash the electro-positive, or basic, constituent. On this view we comprehend why ferro-cyanide of potassium and the alkalies refuse to act on it in the way they do on the ordinary ferruginous salts until an acid be added." But the author, in adopting a nomenclature, leaves the double *proto*salts unprovided for. If, then, the electric condition of these oxides is such that we are obliged to regard them in the light of acids, rather than bases, it seems consistent that, with Berzelius, we should apply the usual termination

of acids to them. Acting on this suggestion, the class of double chalybeate salts would resolve itself into—

Ferr*ic* or *sesqui*oxide salts,

Ferr*oso*-Ferr*ic* or magnetic oxide salts,

And ferr*ous* or *prot*oxide salts.

The ferric salts would be subdivided into true ferric, or such as have *one* equivalent of oxide united to *one* equivalent of acid; and diferric salts, or such as have *one* equivalent of oxide united to *two* equivalents of acid. The name of the one would then be ferrico-citrate of ammonia; of the other, diferrico-citrate of ammonia.

London Medical Gazette.

ART. XXV.—ON MATICO.

BY MR. T. R. N. MORSON.

A Peruvian plant, the *Piper angustifolium* of Ruiz and Pavon, has recently been introduced into this country, under the native name of Matico. The leaves and flowering tops of the plant are the parts imported and introduced by Dr. Jeffreys, of Liverpool, to the notice of the profession as a most valuable remedy in diseases of the genital organs and rectum. He considers its activity to depend on its essential oil, and recommends its use in the form of infusion or decoction, in the proportion of from half-an-ounce to one ounce to the pint of water. Dr. Hunter Lane, also, has written on this medicine, and used it in various cases. The leaves are covered with fine hair, and have been recommended as a styptic; which property depends, I think, on their structure, and not on their chemical composition. The natives use this plant for similar diseases.

The leaves of matico, treated with boiling alcohol, yield a quantity of dark-green extract, almost entirely soluble in sulphuric ether; warm to the taste, and containing a notable quantity of vegetable wax, resembling in its properties the wax obtained from lac, and of which a very small proportion, dissolved in boiling alcohol, will cause it to solidify on cooling. Its active properties seem to reside in its resin and essential oil, as is the case with others of its family, for although it yields a large proportion of aqueous extract, (one-fourth of its weight,) yet this extract has little, if any, of the peculiar properties of the plant—it is slightly bitter and astringent, but possesses even these properties in no remarkable degree; it is therefore evident that the alcoholic extract or tincture should be employed, perhaps also the infusion.

Piper angustifolia or matico has been used by several practitioners, who speak highly of its useful properties in diseases of the mucous membrane; and I may, without expressing any very sanguine expectations of its obtaining a superiority over others of its family, recommend its being well tried, as it is the only instance of the leaves of a piper imported for medical use; and as we are well aware that the peculiar properties of plants reside in very variable quantity in different parts of their structure, it is desirable to be enabled to investigate them all, a knowledge of facts being in this matter very important.

Mr. Girdwood has favored me with a statement of several cases, in which it has been found useful.

One of the most interesting and remarkable of the plants, of this family remains to be noticed—the *Piper methisticum* ava or kava of the Sandwich or Tonga Islands: the name of *Piper inebrians* has also been given to this pepper from its property of intoxicating. The natives of these islands employ the root of this plant, occasionally only the leaves, but it is in its enormous root and stem that its properties chiefly reside. I am not aware of any chemical examination of this substance, although it certainly merits a

very attentive one. In the voyage of Captain Cook, you have a description of cava-drinking, but the best account of the employment of it is given by Mariner, in his interesting *History of the Tonga Islands*, in which he resided for many years; it is as follows:

"The root is split up with an axe, or any such instrument, into small pieces; and being thus sufficiently divided and scraped clean with mussel-shells, &c., is handed out to those in attendance to be chewed. There is now heard an universal buzz throughout a part of the company, which forms a curious contrast to the silence that reigned before; several crying out, 'Give me some cava! give me cava!'—each of those who intend to chew it crying out for some to be handed to them. No one offers to chew the cava, but young persons who have good teeth, clean mouths, and have no colds; women frequently assist. It is astonishing how remarkably dry they preserve the root, while it is undergoing this process of mastication. In about two minutes, each person having chewed his quantity, takes it out of his mouth with his hand, and puts it on a piece of plantain or banana leaf, or sometimes he raises the leaf to his mouth, and puts it off his tongue in the form of a ball of tolerable consistence, particularly if it be dry cava root. The different portions of cava being now all chewed, which is known by the silence that ensues, a wooden bowl, of about three feet in diameter and about one foot in depth in the centre, is placed on the ground before the man who is to make the infusion. In the meanwhile, each person who sits at any distance, passes on his portion of chewed root, so that it is conveyed from one to another, till it is received by three or four persons, who are actively engaged going from one side to the other collecting it, and depositing it in the wooden bowl; it is not, however, thrown in promiscuously, but in such a way that each portion is distinct and separate from the rest, till at length the whole inside of the vessel becomes thickly studded, beginning at the bottom and going up on every

side towards the rim: this is done that a judgment may afterwards be formed of the quantity of beverage it will make, as each portion is disengaged from the leaf, the leaf is thrown anywhere on the ground.

"The cava being thus deposited in the bowl, those persons who had been busy collecting it retire to their places and sit down; the man before whom the bowl is placed, now tilts it up a little towards the chief, that he may see the the quantity of its contents, saying, 'This is the cava chewed.' If the chief thinks there is not enough, he says, 'Cover it over, and let there come a man here.' The bowl is then covered over with a plantain or banana leaf, and a man goes to receive more cava root to be chewed as before; but if it be thought there is a sufficiency, he says 'Mix'. The two men, who sit one on each side of him who is to prepare the cava, now come forward a little, and making a half-turn, sit opposite to each other, the bowl being between them; one of these fans off the flies with a large leaf, while the other sits ready to pour in the water from cocoa-nut shells, one at a time.

"Before this is done, however, the man who is about to mix, having first rinsed his hands with a little of the water, kneads together the chewed root, gathering it up from all sides of the bowl, and compressing it together; upon this the mataboole, an attendant, says, 'Pour in the water,' and the man on one side of the bowl continues pouring, fresh shells being handed to him, until the mataboole thinks there is sufficient, which he announces by saying, 'Stop the water.' He now discontinues pouring, and takes up a leaf to assist the other in fanning. The mataboole now says, 'Mix it everywhere equally, and make it firm'—*i. e.* bring the dregs together in a body.

"Things being thus far prepared, the mataboole says, 'Put in the fow;' which is the bark of a tree stripped into small fibres, and has very much the appearance of willow-shavings. A large quantity of this fibrous substance, suf-

ficient to cover the whole surface of the infusion, is now put in by one of those who sit by the side of the bowl, and it floats upon the surface. The man who manages the bowl now begins his difficult operation. In the first place, he extends his left hand to the further side of the bowl, with the fingers pointing downwards, and the palm towards himself; he sinks that hand carefully down the side of the bowl, carrying with it the edge of the fow; at the same time his right hand is performing a similar operation at the side next to him, the fingers pointing downwards, and the palm presenting outwards. He does this slowly, from side to side, gradually descending deeper and deeper, till his fingers meet each other at the bottom; so that nearly the whole of the fibres of the root are by these means enclosed in the fow, forming, as it were, a roll of about two feet in length, lying along the bottom from side to side, the edges of the fow meeting each other underneath. He now carefully rolls it over so that the edges overlapping each other, or rather intermingling, come uppermost. He next doubles in the two ends, and rolls it carefully over again, endeavouring to reduce it to a narrower and firmer compass. He now brings it cautiously out of the fluid, taking firm hold of it by the two ends, one in each hand (the back of the hands being upwards;) and raising it breast-high, with his arms considerably extended, he brings his right hand towards his breast, moving it gradually onwards, and whilst his left hand is coming round towards his right shoulder, his right hand partially twisting the fow, lays the end which it holds upon the left elbow, so that the fow lies thus extended upon that arm, one end being still grasped by the left hand. The right hand being now at liberty, is brought under the left fore-arm (which still remains in the same situation,) and carried outwardly towards the left elbow, that it may again seize in that situation the end of the fow. The right hand then describes a bold curve outwardly from the chest, whilst the left comes across the chest, describing a curve nearer to

him, and in the opposite direction, till at length the left hand is extended from him, and the right approaches to the left shoulder, gradually twisting the fow by the turn and flexures of that wrist; this double motion is then retraced, but in such a way (the left wrist now principally acting) that the fow, instead of being untwisted, is still more twisted, and is at length again placed upon the left arm, while he takes a new and less constrained hold.

"Sometimes the fibres of the fow are heard to crack with the increasing tension, yet the mass is seen whole and entire, becoming more thin as it becomes more twisted, while the infusion drains from it in a regularly decreasing quantity, till at length it denies a single drop. He now gives it to a person on his left side, and receives fresh fow from another in attendance on his right, and begins the operation anew, with a view to collect what before might have escaped him, and so on, even a third time, till no dregs are left, save what are so fine, and so equally diffused through the whole liquid, as not to be thus separated.

"During the above operation, various people are employed making cava cups of the unexpanded leaf of the banana tree, which is cut into lengths of about nine inches, each piece being then unfolded, is nearly square, the two ends are next plaited up in a particular manner, and tied with a fibre of the stem of the leaf, forming a very elegant cup, not unworthy of imitation.

"The infusion of cava being now strained, the performance of which generally occupies about a quarter of an hour or twenty minutes, the man at the bowl calls out, 'The cava is clear.' The mataboole replies, 'Squeeze out,' alluding to the peculiar operation of filling the cups. Two or three now come forward and sit down near the bowl, bringing with them and placing on the ground several of the cups; one then rises and holds with both hands a cup to be filled, standing a little on one side, and holding the cup over the middle of the bowl, so that his body does not obstruct the

view of others. The man who manages the bowl, fills the cup by dipping in a portion of fow rolled together, and which, when replete with the liquid, he holds over the cup, compressing it so that the infusion falls into it, to the quantity of about the third of a pint. The one who has the cup now turns and stands a little on one side, with his face towards the chief, at the same time one of those who have been described sitting by the side of the bowl and employed fanning it, cries out with a loud voice, 'The cava is deposited' (*i. e.* in the cup;) the mataboole replies, 'Give it to ——,' naming the party who is to have it, who hearing his name announced, claps the hollow part of his hands together, to signify whereabout he is seated; the cupbearer the nadvances, and presents it standing, unless it be a chief when he presents it sitting."

Now, it clearly follows from this process, that vinous fermentation cannot take place, as the beverage is drunk immediately it is prepared; its effects, therefore, must be attributed to some narcotic property existing in the root, and which has never, I believe, been separated or investigated; it is, however, worthy of remark, that the peppers were formerly united in one great family with the hemps, and that the latter are narcotic.

The root and stem of this plant abound in ligneous fibre, which, with starch, (also existing in immense quantity,) constitutes its great bulk. From a pithy centre, consisting of lax cells filled with starch globules, proceed plates of woody and vascular tissue, alternating with small cells fiilled with starch. For some magnified drawings of this root I am indebted to my friend Mr. Alfred White, the drawing of the plant itself is copied from an unpublished one in the collection of the late Sir Joseph Banks, in the British Museum.

If this root be distilled it yields a most agreeable essential oil, easily recognizable, and differing from that of other peppers. Treated with boiling alcohol, it yields an extract pungent to the taste, leaving a remarkable impression on

the tongue and throat, and from which I have succeeded in obtaining a crystallizable principle, in a state of great purity, which I consider as identical with piperine, although its mode of crystallization is somewhat different—a difference probably caused by the quantity operated upon. I hope shortly to be able to present to the society a chemical history of this substance, and the result of some trials made to ascertain its medicinal properties; for if we believe the accounts given by travellers, a strong infusion will produce stimulating and sedative effects, lasting for twenty-four hours, and leaving the patient in profuse perspiration—effects which render it eminently worthy of medical investigation. The abuse of it by the natives of the Tonga Islands, who are passionately fond of it, is said to render them thin and emaciated, and they are reported to use it to counteract great obesity; but all these statements require confirmation.

Mons. Lesson, in the *Bulletin des Sciences Medicals*, published about twenty years since, a curious notice of this plant, which he states is also employed in Carolina by the natives to prepare a drink which they call Scheaka: he mentions its use by them in rheumatism, and diseases of the genital organs, and terminates with the following observations:

"The English Apothecaries have recently introduced the cava root into all their shops, and extol the tincture as a remedy in chronic rheumatism, &c. Numerous ships are now employed in transporting this root to England."

Where Mons. Lesson obtained his information I know not; he would certainly have found it difficult to obtain this root of any Apothecary or Chemist, although it has been employed in England without any very accurate experiments having been made.

Lond. Pharm. Journ.

ART. XXVI.—ON MR. PATTINSON'S MAGNESIA ALBA, AND ON THE COMPOSITION OF THAT SUBSTANCE GENERALLY. By George Fownes, Ph. D.

Having been presented by Mr. Morson with a specimen of the *magnesia alba*, prepared by the new and very ingenious process of Mr. Pattinson, described at the last Pharmaceutical Meeting, I lay before the Society a short notice of the result of its examination.

The color of the sample was beautifully white, and it yielded, after calcination, perfectly white magnesia; it was quite tasteless. When thrown into dilute hydrochloric or sulphuric acid, it dissolved with lively effervescence, the solution being quite complete, and the liquid free from turbidity. The solution, neutralized by ammonia, and mixed with oxalate of ammonia, remained quite unaffected, even after the lapse of many hours. The same solution mixed with excess of carbonate of ammonia, and warmed, underwent no change. Hence, I infer, the complete absence of lime. There is a minute trace of oxide of iron, but the quantity is exceedingly small and quite unimportant.

The analysis of this compound was effected by the following means:

A weighed quantity was exposed to a full red heat for fifteen or twenty minutes, in a covered platinum crucible; the residue, found on examination to be pure magnesia, gave the quantity of that substance present. The carbonic acid was determined directly by decomposing a known weight of the preparation by excess of sulphuric acid, with the usual precautions. The water was estimated by difference—100 parts were found in this manner to contain,

Magnesia, - - - - -	41.6
Carbonic Acid, - - - -	36.0
Water, - - - - -	22.4
	100.

These numbers correspond almost exactly with those obtained in the analysis of a specimen of *magnesia alba*, prepared by myself in the usual manner, more than seven years ago—100 parts gave,

Magnesia,	41.2
Carbonic Acid,	36.0
Water,	22.8
	100.

Magnesia alba appears, in fact, to be a substance of very constant composition, although from the mode of its formation, viz., the partial decomposition of the neutral carbonate first thrown down, by the water, in the old method of preparation, we might be led to think the reverse most likely to be true.

It is well known to those engaged in Pharmacy, that there are met with in commerce two varieties of magnesia alba; the one exceedingly light and bulky, the other much denser. This difference arises solely from the state of mechanical condition; the two kinds having a chemical composition sensibly the same, as will be seen by a comparative statement of their composition, determined as above.

	Light Magnesia Alba.	*Heavy Magnesia Alba.*
Magnesia,	42.8	41.2
Carbonic Acid,	36.0	36.4
Water,	21.2	22.4
	100.	100.

A specimen of heavy magnesia alba prepared by myself, gave

Magnesia,	41.2
Carbonic Acid,	35.6
Water,	23.2
	100.

It is improper therefore to apply, as is sometimes done, different names to the preparation.

The formula assigned by Berzelius to magnesia alba,

$$3\,(Mg.\,O, C\,O_2) + Mg.\,O, H\,O + 3\,H\,O.$$

does not agree with the analytical results. Reckoned to 100 parts, it gives

Magnesia, - - - -	44.57
Carbonic Acid, - - - -	44.77
Water, - - - - -	19.48
	100.

Mr. Phillips, whose experiments coincide exactly with my own, has deduced the formula

$$4\,(Mg.\,O, C\,O_2) + Mg.\,O\,2\,H\,O + 4\,H\,O.$$

which is probably the correct one.

Ibid.

ART. XXVII.—ON THE FORMATION OF HYDROCYANIC ACID FROM THE RE-ACTION OF NITRIC ACID ON ALCOHOL. By M. Dalpaiz.

The author having had occasion to prepare some spirit of nitric ether according to the process of the London Pharmacopœia, observed that the product afforded a white flocculent precipitate with nitrate of silver, possessing all the characters of cyanide of the metal. The formation of hydrocyanic acid under the circumstances was an interesting fact; but M. Dalpaiz was not satisfied with having observed it: he was anxious to study the influence of varied proportions of acid and alcohol, and of different degrees of temperature, upon the phenomena observed.

He distilled, by the heat of a water-bath, a mixture of

Rectified spirit, sp. gr. .847,	360 grammes.
Distilled water,	180 "
Nitric acid, sp. gr. 1.384,	90 "

The products being collected in five separate parts all afforded precipitates with nitrate of silver, and these precipitates together weighed 0.65 of a grain.

A fresh mixture of

Spirit, sp. gr. .827,	100 grammes.
Nitric acid, sp. gr. 1.384,	100 "

Was gently heated in a large retort. Ebullition continued for two minutes, without the solution of nitrate of silver, into which the products were received, being rendered in the least degree turbid, but all at once there was so great a disengagement of hydrocyanic acid that the liquor instantly became milky and curdy. Unfortunately, a few seconds afterwards the retort broke, and the disengaged vapors were so highly charged with hydrocyanic acid, that the operator was obliged to quit the laboratory. The result of this experiment being inconclusive, M. Dalpaiz recommenced it, taking the precaution to moderate the action of the ingredients, by applying cold water to the retort. In this instance, the proportion of hydrocyanic acid disengaged was extremely small, and it is probable that none would have been formed if the action had been moderated still further. An elevation of temperature, therefore, is favorable to the formation of hydrocyanic acid.

M. Dalpaiz concludes his paper by observing that, of the numerous examinations he had made of specimens of commercial nitrous ether, with the view of ascertaining whether they contained hydrocyanic acid, nearly the whole had afforded negative results; but that he had always found a considerable portion of formic acid.

These researches of M. Dalpaiz have been very favorably reported upon by Messrs. Bernard, Derose, and Chatin. The experiments which these gentlemen undertook in connexion with their report, show that hydrocyanic acid is produced in notable quantity during the action of nitric acid on fatty bodies. They state also, that when one part of alcohol and two parts of nitric acid are carefully distilled, the

product does not contain the least trace of any compound of cyanogen.

We may add, that the formation of hydrocyanic acid during the reaction of nitric acid on certain organic matters, is not a recent observation. In 1839, M. Gauthier de Claubry proved the presence of hydrocyanic acid in the alcohol left after the preparation of fulminates; and in the following year, M. Sobrero showed that it was also formed on distilling nitric acid with volatile oils, or even with some resins. M. Thenard also, some time ago, announced that this acid was one of the products of the reaction of nitric acid on sugar, gum, &c. Nevertheless, the observations made by M. Dalpaiz, with reference to the particular case to which he has alluded, are interesting and valuable.

Journal de Pharmacie and Pharm. Journal.

ART. XXVIII.—ON THE HEAVY CARBONATE AND CALCINED MAGNESIA. By Mr. Richard Phillips, Jun.

My attention having been directed to the above named preparations, I was induced to make some experiments upon them, the results of which may, perhaps, be interesting to the Society.

I found that upon one atom, or 123 parts, of crystallized sulphate of magnesia being boiled with one atom, or 59 parts, of sesquicarbonate of ammonia, the half atom of carbonic acid was expelled from the sesquicarbonate of ammonia, and a dense carbonate of magnesia was precipitated. This, however, when washed, dried, and calcined, lost its density.

I repeated this experiment with this difference, that I evaporated the precipitate and the sulphate of ammonia

formed, down to dryness, and the density of the carbonate of magnesia was increased; but when the sulphate of ammonia and carbonic acid were expelled by calcination, the magnesia in this case also lost its density. It then struck me, that as the density of the carbonate of magnesia had been increased by evaporating it with the salt formed to dryness, that if the residue could be heated without expelling it, the density would be retained. In order to do this by the Pharmacopœia process, one atom, or 123 parts, of crystallized sulphate of magnesia was boiled with one atom, or 144 parts, of crystallized carbonate of soda, the whole was evaporated to dryness, and a carbonate of magnesia, of nearly equal density with that formed by the sesquicarbonate of ammonia, was left. The residual salts were then calcined, and afterwards allowed to remain in water until all the sulphate of soda was dissolved out. The magnesia, when washed, was found to be of the required density.

In the directions of the Pharmacopœia, the carbonate of magnesia is ordered to be calcined for two hours. I found that half an hour, at a good bright heat, all the carbonic acid was expelled. The sulphate of magnesia of commerce sometimes contains a very small quantity of a persalt of iron; which quantity, however small, will give a reddish tinge to the calcined magnesia. This may be got rid of by dissolving the sulphate of magnesia in water, and adding lime-water until the color of reddened litmus paper is restored; the solution must then be allowed to stand for twenty-four hours, when peroxide of iron, and any excess of lime which may have been employed, will be precipitated. The most delicate test that can be employed for the presence of iron is the ferrocyanide of potassium. I may, perhaps, also state, that I have found the sulphate of magnesia, which is sold in the shops, generally adulterated with sulphate of soda, and that, if pure, 100 grains of it ought to yield 16.2 of calcined magnesia.

Pharmaceutical Journal.

ART. XXIX.--ON RADIX SUMBUL, THE PERSIAN MUSK ROOT.

By H. Reinsch and M. Buchner.

Notwithstanding the great intercourse with Persia, this interesting root appears to be as yet entirely unknown in Europe; the only notice of it is given by Erdmann and Ledebour in Dierbach's edition of the botanical portion of Geiger's "Pharmacy." It is there stated to be imported from Bokhara into Russia, and is said to resemble the white Hellebore, and to have a blackish-gray epidermis (which does not agree with the roots now under consideration), and to contain much mucus and an acrid resin having the odor of musk, but no essential oil, although the water distilled from it possesses a smell of musk. This root is not mentioned in any other pharmacological work, and even the "Pharmacopœia Persica," which appeared in Paris in 1681, contains no reference to it. It may now be had in Nuremburg and Hamburg at a very cheap rate. According to information supplied us by one of the importers, it comes from Persia by way of Nischnei-Novogorod to Europe, and is employed in Persia, on account of its odor, against mephitic vapors.

The root is very thick, fleshy, tuberose, and cut into discs of the diameter of from 1 to 4 inches, and in height from ½ to 1½ inch. From the pieces of the upper part of the root, it is evident that the stem can scarcely be 1 inch in thickness. The root divides downwards in a few thick branches, and appears to have very few lateral fibres; the epidermis is thin, grayish-brown, somewhat wrinkled, *i. e.* provided with diagonal furrows or corrugations; the parenchyma appears in the fresh state to be very fleshy, but dried it is cellular, foliaceous, and containing very numerous globules

of starch, the freshly divided surface is yellowish-white, and is rendered dark blue by iodine, but as the root occurs in commerce the surfaces appear of a dirty brownish-yellow color, and partly covered with exuded and dried milk-sap. The taste is spicy, bitter, of considerable duration, but not disagreeable; but the most peculiar character is undoubtedly its odor, which at some distance resembles musk so strongly and distinctly, that several pharmaceutists whom we asked to smell the paper in which a slice of the Sumbul root was folded in order to have their opinion, unanimously pronounced it to be musk; but when held near, and especially with a fresh section, the odor resembles at the same time that of Apium or somewhat that of Angelica. The odor adheres very strongly to linen, and is not entirely removed by washing; the taste is slightly sweet, musk-like, subsequently aromatic. Since the odor of musk is increased by ammonia, the authors placed some fine sections of the root in a glass, and moistened them with very dilute solution of ammonia, but now another aromatic odor appeared instead of the musky one. Dilute sulphuric acid also produced a different odor, which might almost be termed a rotten one; but on dropping a little *concentrated* sulphuric acid on a slice of the root, a very strong and decided odor of valerianic acid was produced, and the liquid became of a beautiful wine-red color, which after a few hours passed into brown, while the smell of the acid still continued.

Reinsch submitted the root to analysis, and obtained the following result:—

Water	0.130
Essential oil, not smelling of musk	
1. *Extract with Æther.*	
A nearly-colorless balsam	0.126
A waxy substance	0.002
2. *Extract with Alcohol of* 0.8194 *spec. grav.*	
Balsam	0.002
Aromatic resin	0.003
A bitter substance, soluble in alcohol and water	0.010

3. *Extract with Alcohol of* 0.9335 *spec. grav.*

Bitter substance, soluble in water with vegetable gelatine and vegetable acid salts - - -	0.064
A bitter yellow coloring substance, soluble in alcohol - - - - - - - - -	0.040

4. *Extract with Water.*

Gum, soluble in cold water - - - - - -	0.082
Starch and salts - - - - - - - -	0.284
Gelatinous sediment - - - - - - -	0.072

5. *Extract with Solution of Potash.*

Starch (in combination with the fibre) - - -	0.100
Insoluble fibre - - - - - - - -	0.076
	0.991
Loss - - - - - - - - - -	0.009

The most interesting substance in this root is the balsam which ether extracts, which resembles in consistence and color copaiva balsam. It possesses a burning aromatic taste but only a faint musky odor, which, however, is strongly developed when the balsam has been placed for some time in contact with water; it differs very decidedly in its properties from most other vegetable substances: for instance, it dissolves in sulphuric acid with a splendid blue color. This reaction is best obtained when a concentrated alcoholic solution of the balsam is dropped into sulphuric acid diluted with its equal weight of alcohol.

When the balsam is heated alone in the retort, a clear yellow oil, having a taste of peppermint, distils over at the commencement, after which the residue in the retort is converted into an indigo-blue mass, and finally an emerald-green oil passes over.

The balsam is easily soluble in solution of potash, and forms with it a crystalline mass; when this is dissolved in water and decomposed with sulphuric acid, the balsam is re-obtained apparently unaltered; but if some water is

poured over this, and it is then placed aside for a few days, it becomes partially converted into beautiful transparent prisms, which have a most powerful odor of musk. Some other constituents of this root likewise appear to be extremely interesting in a chemical point of view.

The root, therefore, is in every respect similar to Angelica, and is certainly derived from some large umbelliferous plant; but it is of a brighter color, with fewer ramifications or fibres, less spicy in taste and more bitter, and has a totally distinct odor. It might perhaps be supposed that the odor had been artificially communicated, perhaps by packing it between empty musk-pods; and this suspicion might receive additional support from musk being consumed by the Persians in considerable quantity, not only as an article of luxury, but also as medicine, for we find in the Persian Pharmacopœia a considerable number of compound medicines of which musk forms a constituent. The authors, however, are not inclined to this opinion, because the odor is not merely externally adherent, but is also disengaged from fresh sections of the root. Undoubtedly it is closely allied to Angelica in its medical properties.

Chemical Gazette, from Buch. Rep.

ART. XXX.—ON OPIUM.

M. Texier states that the differences which are found in the qualities of the various opiums from the same soil, are not solely owing to the composition of the collected juice of the poppy, but rather to the different states of the atmosphere during its collection.

It is well known that the opium is collected by forming some horizontal incisions round the capsules, and allowing the juice to flow slowly from it for twenty-four hours. If, during this operation, any rain, fog, or moisture should occur, the quality of the opium suffers; a few hours' rain suffices entirely to destroy the opium harvest. For this reason the poppy is cultivated in Asia Minor, only on the large table-lands of Cappadocia and of Phrygia, in the neighborhood of the town of Karahissar; it is not an excessively hot country that is favorable to the cultivation of opium, but it is requisite to be nearly certain that there should be no rain from the flowering season of the poppy until the opium is collected. The poppies are cultivated in Asia Minor on irrigated lands.

One of the causes of the bad quality of the opium collected in Asia Minor of late years, is the sophistication with Armenian bolus and other earths to which it is submitted.

Ibid, from Comptes Rendus.

ART. XXXI. — ON MADDER. By M. GIRARDIN, Professor of Practical Chemistry at the Municipal School of Rouen.

(Concluded from page 51.)

5. *On the Adulteration of Madders and Methods of detecting them.*

ON account of the high price of madder, and especially from the facility of introducing into this substance, which is sold in the form of powder, foreign pulverulent matters, which the most practised eye cannot detect, this root is subject to a number of sophistications which cannot be too fully exposed.

There are two kinds of adulterations. Sometimes earthy or mineral substances are incorporated with the powder of madder; sometimes vegetable substances are added to it, the color of which resembles that of madder.

1. *Adulteration by Mineral Substances.*—The mineral substances which have been introduced, or which are still found in ground madders, are brick-dust, red and yellow ochre, yellowish sand, yellowish clay or argillaceous earth. A madder which contains earthy substances grates between the teeth when chewed.

A small quantity of such a madder, for example from 25 to 30 grms., introduced into a large glass globe and diluted with 5 or 6 litres of water, quickly deposits the greater portion of the earthy substances at the bottom of the vessel. When the suspended matter is decanted, and the deposit agitated with a fresh quantity of water, the earthy substances are isolated and may be examined.

However, to determine the proportion, more exact processes must be had recourse to. The best is that of calcining, at a red heat, in a platinum crucible.

5 grms. of the madder under examination are first dried completely at 212° Fahr., and are weighed with great exactness, and then put into the platinum crucible, which must be weighed beforehand. The crucible is shut and heat gradually applied. When perfectly incinerated, the crucible is taken out of the furnace and left to cool, and then weighed. Its weight being deducted from the quantity employed, the difference gives the proportion of cinders obtained.

These cinders are composed—1st, of the fixed mineral matters contained in the root; and 2d, of the earthy substances, foreign to the chemical constitution of the root, and which have been accidentally or fraudulently mixed with the madder.

Some experiments which I made with M. Labillardière on a large scale, in 1828, showed us that madder which is

very pure, and quite free from its epidermis or any foreign earthy matter, and dried with care, gives by incineration 5 per cent. of ash; that the Lizaris of Provence, stripped of its pellicle, gives on an average 8.80 per cent. ash.

According to M. Henri Schlumberger, 100 parts of Alsatian Lizaris, washed in distilled water, and dried at 212°, give 7.20 per cent. of ash; whilst 100 parts of Lizaris of Avignon, prepared in the same way, give 8.766.

According to M. Chevreul, 100 parts of Lizaris from the Levant, dried at 212°, give 9.80 ash.

When an Avignon madder, SFF, (the mark most generally used,) subjected to the test of incineration, gives a greater weight of ash than 5 per cent., which I have taken as the mean of numerous experiments, the excess must be attributed to the presence of foreign earthy or sandy matters, either arising from adulteration or a careless preparation of the powder.

When the excess is only from three to four-hundredths, it is probably owing to some fault in the preparation of the madder, the manufacturer not having separated the epidermis (which is always coated with the earth which surrounds the roots) carefully enough by grinding; but when the excess is above 4 or 5 per cent. or more, it is the result of fraud.

The madders obtained from the merchants give very variable results with respect to the proportions of ash which they furnish, as the following table shows:—

	Per cent. of Ash.
On 6 trials the mulle madder of Avignon gave	4.00
On 7 trials the madder SF of Avignon gave from	12.40 to 20.00
On 18 trials the madder SFF of Avignon gave from	7.40 to 23.00
On 4 trials the madder SFFRP of Avignon gave from	12.00 to 16.00

On 3 trials the madder SFFP of Avignon gave from - - - - - 10.00 to 10.80

On 7 trials the madder EXTF of Avignon gave - - - - - - - 10.00

When in testing a madder by incineration, the quantity operated on amounts to 5 grammes, the weight of the ash must be multiplied by 20 in order to bring it to 100 parts, and from the figure obtained 7 parts, representing the mean weight of ash p. c. furnished by good madder substracted; the surplus then represents the proportion of earthy matters or of sand added by the manufacturer. Consequently, a madder furnishing 16.40 per cent. of ash will contain 9.40 per cent. of foreign matter.

2. *Adulteration by Vegetable Substances.*—The vegetable substances which are introduced into the madders are powders of little or no value, such as sawdust, almond shells, bran, the bark of the so-called pine-tree, mahogany wood, log-wood, sandal wood, and fir tree wood.

The sophistication of madders by these different substances is much more prejudicial to the dyer than that by mineral substances; for besides diminishing, like the latter, the quantity of coloring matter of a given weight of madder, they also injure the dye, either by absorbing the coloring matter or by preventing the colors becoming so bright.

Unfortunately the means of detecting this new kind of fraud are neither so rigorous nor so simple as the process for determining the presence of mineral matters. It is extremely difficult to ascertain with what kind of vegetable substance a madder has been adulterated; it is mostly only possible to ascertain that there is a mixture. This, however, is the most important point, and the practical man, after all, only needs to know the tinctorial worth of the madder which he buys.

Many methods have been proposed to determine the tinctorial value of madders and the absolute quantity of the coloring principal which they contain; but the greater part of

them have the fault of being too exact, or too difficult and too long of execution. I will now point out those which I think preferable, and which I have long since employed in the examination of madders which I continually make.

One of these means consists in determining the coloring power by means of Labillardière's colorimeter; the second, in determining this coloring power, as well as the solidity and brilliancy of the colors, by an operation of dyeing. The third experiment is to ascertain the absolute quantity of the coloring principle.

These different experiments are always made comparatively, by taking for type a madder prepared with all possible care, and having the same marks as that under examination. As with indigo and other tinctorial substances, a single experiment is not sufficient; and by reason of the difficulty there is of correctly verifying the value or the quality of the madders, it is indispensable, in order to decide with any certainty, to check the experiments by each other. This is the only way of obtaining satisfactory results.

1. *Determination of the coloring Power by the Colorimeter.*—The following is the mode of operation with the colorimeter of Labillardière. The type madder and the madder under examination are dried at 262° Fahr., and an account is kept of the respective quantities of hygrometric water they contain.

25 grms. of each sample are then mixed with 250 grms. of water at 68°. After three hours of contact, the whole is thrown upon a linen cloth. A second maceration is made with the same amount of water and for the same length of time. The madders are then washed with 250 grms. of cold water, dried at 212°, and weighed, in order to ascertain the proportions of soluble, saccharine and mucilaginous matters which they have lost by these preliminary washings, which only remove an insignificant quantity of red coloring matter.

5 grms. of each of the two madders are then introduced

into little glass globes with 40 parts of water, and 6 parts of very pure alum, boiled for a quarter of an hour, and the boiling liquids filtered. The grounds are washed with 2 parts of hot water. Two other decoctions, similar to the first, are made, and each time the residue is washed with 2 parts of hot water. The products of the three decoctions are combined, and the liquids from the two samples of madder compared by the colorimeter.

Without doubt this examination with the colorimeter is not sufficiently accurate, but it affords valuable indications, which, joined to those resulting from the following tests, enable us to give a decided opinion.

2. *Determination of the Tinctorial Power by Dyeing.*—In order to estimate the value of a madder by dyeing, a madder of superior quality must be taken as a type of comparison, with which skeins or mordanted calicoes have been already dyed, by acting with determinate quantities of powder, tissue and water. Patterns for comparison should be prepared in the following manner:—

Calicoes are selected, mordanted for red and black, and well-cleansed in a dung-bath. They are divided into pieces 5 centimetres square, and are dyed with proportions of madder increasing progressively from 1 grm. up to 10 grms., so as to have a scale of 10 shades, of which the gradations represent each a known weight of madder. The garancing of these pieces is practised in the following manner:—In a great copper basin, with a flat bottom, which is covered with a layer of hay, are placed three or four glass jars with wide mouths, containing from 1½ litre to 2 litres. The basin is filled with ordinary water heated to 104°; then into each of the glass jars the piece of mordanted calico is introduced, the madder weighed with care, and lastly, three-fourths of a litre of distilled water heated to a temperature of 104°. A thermometer is inserted in the water-bath, which is heated slow enough for the water not to reach 167° until after an hour and a half, avoiding carefully alternations of tempera-

ture. After this it is made to boil for half an hour, the samples are taken out, rinsed in cold water and dried. Each dyed piece is cut in half; one-half is preserved as it is, the other is subjected to the following clearings:—We begin by a soap-bath at 122°, made with 2½ grms. of white soap to each litre of water. After it has been half an hour in this bath, the cloth is carefully rinsed in cold water. A fresh soap-bath is given, to which is added half a gramme of salt of tin, and which is kept at boiling point for half an hour. It is washed and rinsed. The well-rinsed samples are dried with care and preserved from the light.

When a series of tints of two different states have been thus prepared, that is to say, a dye without and with clearing, it is very easy to ascertain the comparative value of an unknown madder. In fact it is sufficient to take 10 grms. from the barrels, and to go through the preceding operations on 5 square centimetres of suitably-mordanted calico, and to compare the dye obtained, before and after the clearing, with the ten samples. If, for example, the shade is equivalent to No. 5 of the madder, it may be concluded that the unknown madder is inferior by half to the madder-type, since $10 : 5 :: 100 : x = 50$.

Whatever vegetable powders may have been fraudulently introduced into the madders, whether tinctorial or inert, they can never lead to error as to the true tinctorial value of the mixture, inasmuch as the colors which they afford, and which saturate the mordants at the same time as the red principle of the madder, cannot withstand the action of the clearings as the latter does; they *run*, as is said, in the soap and tin-baths, and in the end there only remains the color from the madder upon the tissue. The clearings are therefore necessary to show the solidity and vivacity of the tints obtained.

Instead of printed calicoes, skeins of oiled and mordanted cotton may be used in the state in which they are prepared for dyeing Turkey-red. In this case skeins of the weight of

10 grms. are taken and dyed with different weights of good madder, from 20 to 30 grms., in order to obtain a scale of ten distinct shades.

This test is that which I have employed since 1831, and which has been since adopted in all our print-works of Rouen and Bolbec, where my pupils have introduced it. It differs very little from that which was published in 1835 by M. H. Schlumberger of Mulhausen.

3. *Determination of the Quantity of the coloring Principle.*—The most exact process hitherto published is without doubt that made known by M. H. Schlumberger in 1838, as modified by M. Scheurer. But this process, which is founded on the solubility of the red coloring principle of the madder in weak acetic acid, a fact pointed out as early as 1829 by an anonymous chemist, is unfortunately too sensitive, and requires too great a degree of skill in the manipulation to become general.

The following is the method which I have long been accustomed to employ :—50 grms. of madder are diluted with 50 grms. of concentrated sulphuric acid. The whole is left in contact for some hours; too high a temperature should be avoided; the charcoal obtained is mixed with water and thrown upon a filter; it is then washed until the water passes through quite insipid; and next dried at a temperature of 212° Fahr. in Gay-Lussac's water-bath. This charcoal is reduced to a fine powder and macerated for two hours at three distinct intervals with cold alcohol containing a little ether, in order to free it from a fatty matter which it retains. The powder is boiled in alcohol of 0.834, at three different intervals, employing each time about 250 grms. of alcohol. When this is no longer colored by ebullition, the alcoholic liquors are mixed, and distilled in a small glass retort to the consistence of a syrup, and the concentration of the liquid completed in the water-bath in a weighed porcelain crucible. When the extract is perfectly

dry, its weight is taken. This represents the proportion of red tinctorial principle contained in the madder.

This process is rather long; it does not give, especially on a small scale, the absolute proportion of coloring principle contained in the madder; there is a slight loss, but by acting comparatively a sufficient approximation is obtained.

Such are the different methods for ascertaining the quality, the purity, or the adulteration of the madders. In most cases calcination is sufficient, and rigorously, calcination and the test by dyeing made conjointly, allow the practitioner to form a positive opinion of the value of the madders submitted to examination.

Considering the minutiæ and the number of operations which it is necessary to have recourse to, in order to form a just estimate of the relative worth of the madders, it is evident that an examination of the madders by simply looking at them, as is customary with the merchants, can afford no precise information, and must indeed lead in most cases to erroneous conclusions. The process in use amongst merchants consists in spreading samples of madders of about 30 to 40 grammes side by side on a sheet of paper, which small heaps are flattened and their surfaces rendered smooth with the back of an ivory spatula. The samples are then placed in a cellar, or some moist situation, where they remain from twelve to fifteen hours. At the expiration of this time the quality is judged of according to the brightness and tint of the powder.

But as M. H. Schlumberger has already observed, this method does not even approximately show the richness of color of the madders, since a somewhat long contact with the air is sufficient to render them darker, and many circumstances may change their tint, without thereby causing their tinctorial value to vary. On the other hand, the old madders, of a dull tint, may be far superior to others of a more beautiful color. The merchants' and brokers' method of trial often places the manufacturer in a false position, by

obliging him to brighten the tint of his powders, in order to make them more saleable, and that sometimes to the injury of the tinctorial power; thus facilitating the adulteration of the madders by mixture with foreign substances, suitably colored and pulverized, which serve to heighten the tint of the powder; and it is impossible to ascertain the presence of these mixtures by exposure in the cellar, of which I have often had proofs. I have purposely made mixtures of madder, of powders of mahogany and of sandal wood in known proportions, and these mixtures, when tried by the merchants, who thought themselves very skilful in their estimation of madders, by the above process, were considered by them to be pure madders of first quality!

Testing of the Garancines.—The quality of the garancines varies, as I have already stated, considerably. A manufacturer sometimes sends a series of from fifteen to twenty barrels of excellent quality, and fifteen days later sends another series which is worth from 20 to 25 per cent. less than the preceding one. It often happens that in the same series good and bad garancine is found; each barrel therefore of this product should be tested comparatively as far as possible. It is now customary for the seller to take back the garancines which he had delivered to the calico-printer, allowing for the pieces spoiled, when the quality of the powders was inferior to what it was represented.

The testing of garancines is made on a large and on a small scale. In the latter case the following is the process we adopt:—

Samples are taken from the barrels as they arrive, taking care to cork the labelled bottles in which they are inclosed as quickly as possible, in order that they may not dry, which in summer time especially causes an amelioration of from 5 to 6 per cent. in a few days, on account of the water which evaporates.

A piece of calico, printed in stripes of red, violet, puce and garnet, is taken (black is useless, as all the garancines

produce that well,) not gummed as usual, and dried. As many decimetres are cut from it as there are garancines to to be tried, and the pieces are marked by notching them with the scissors: the notches must correspond with the numbers on the bottles.

From 1.9 grm. to 2 grms. of garancine, known to be good, is weighed off to serve as standard, and for the garancines to be tried, we take 1, 2, 3, 4, 5, 6, 7, 8, 10 times more or less of 1.90 or 2 grammes, according as they cost 1, 2, 3, 4, &c. more or less than the standard sample. As the samples are weighed, they are each put into a jug with a wide mouth holding half a litre, with from 2 to 2½ decilitres of water containing some oxalic acid, in the proportion of 15 centigrms. to a litre. The jugs are numbered so as to correspond with the samples of the garancines and strips of calico. They are placed in a water-bath, in a copper boiler with a flat bottom, the pieces of printed calico are immersed in them, and dyed as in testing the madders, regulating the fire so as to raise the temperature to 158° in an hour and a half, and keeping it at the boiling-point for half an hour. After the process of dyeing, the samples are removed as quickly as possible from the vessels, rinsed in water and beaten, and then dried or previously immersed for five or six minutes in a bran-bath at 167°. When dry they are compared, and in this manner the relative tinctorial value of the garancines may be estimated as nearly as possible.

In employing calicoes, which present at the same time stripes mordanted for red, violet, puce and garnet, it is seen at once whether the garancines can be employed with advantage for all the colors, or for what tints they are most suited. I have already stated that the same garancine does not always suit equally well for red, puce and violet.

Lond. Chem. Gaz. from Journ. de Pharm.

ART. XXXII—ON THE PREPARATION OF MERCURIAL OINTMENT.

By M. Fossembras.

There are few pharmaceutical preparations that have given rise to so many investigations and theories as mercurial ointment. So much has been said on the subject that anything new may at the very outset appear fastidious and useless.

It is with some hesitation therefore that I publish these considerations, which have suggested to me the employment of a process which allows 8 lbs. of mercurial ointment being prepared in less than one hour. The process which I employ consists simply in the use of rancid fat, but it is so easy of execution that I have thought it right to rescue it from the oblivion into which it has fallen. Only 25 grms. of this substance are requisite for a pound of ointment, and so small a quantity is not capable of communicating injurious properties to a medicine which can never be preserved for any length of time from becoming rancid, and which is scarcely ever employed in any other state.

The requisite conditions for a prompt division of the metal may be reduced to two,—1st, dividing by trituration; and 2d, preventing the reunion of the separated particles. The first condition is always complied with, but the second scarcely ever. In fact, fresh lard not possessing any agglutinative properties can for that very reason not retain the mercurial powder and prevent the reunion of its particles. Fresh lard therefore is incapable of extinguishing mercury in a perfect manner.

It may perhaps be objected, that a continued vigorous working is always followed in a short time by success; to which I would answer, that I have never seen the work terminated before the fat has acquired a rancid odor.

But why is this state of alteration of the fatty matter favorable to the extinction of the metal? The first thing that attracts our attention in rancid fat is its consistence. When it has been allowed to attain that degree of alteration at which it still possesses a certain softness, it will be perceived that it has acquired very marked agglutinative properties. When agitated in the mortar, it adheres strongly to the pestle. If a certain quantity of mercury is now poured into this triturated mass, and agitation continued, the metal is divided immediately, and the adhesion of the fat which surrounds each of the particles will necessarily prevent their reunion.

I will now relate the facts which prove the truth of the above considerations. I had exposed for some months to a moist atmosphere about a pound of fat; when I employed it, it was not hard, but it adhered strongly to the fingers. I took 200 grms., and triturated it for some minutes in a marble mortar, when it became soft like thick honey; I then poured 4 lbs. of mercury in portions of 300 grammes, and five minutes of trituration always sufficed for the complete extinction of the metal. After the introduction of the fourth portion the ointment had become somewhat hard, but the addition of a little oil of sweet almonds allowed of the operation being easily continued. In this manner I was enabled to incorporate 4 lbs. of mercury in the 200 grms. of fatty substance. Not the least metallic particle could be detected with the lens throughout the whole mass. I then added the 1800 grms. of recent lard in a state of semifusion, and after a quarter of an hour's trituration I obtained a perfectly homogenous ointment, in which the mercury was extinguished most completely.

N.B. The above process is not very new, but it is eminently successful. It is similar to the method of MM. Coldefy and Simonin, which consists in extinguishing the mercury in a small quantity of lard, which has been prepared by melting it, pouring it into water, and exposing it to the action of the atmosphere.—*Journ. de Pharm.*

ART. XXXIII.—RESEARCHES ON NARCOTINE AND THE PRODUCTS OF ITS DECOMPOSITION.

By Prof. Wöhler.

This investigation was undertaken in the hope that the products of decomposition of the vegetable alkaloids, of which as yet very little is known, might throw some light on the peculiar constitution and mode of origin of this remarkable class of bodies. For several reasons narcotine was first selected. Exposed in the presence of an acid to oxidizing influences, it is decomposed into an acid containing no nitrogen, into an organic base and carbonic acid. This decomposition is best effected by heating a solution of narcotine in excess of dilute sulphuric acid, with finely pulverized hyper-oxide of manganese as long as any carbonic acid is given off. The new acid has been called opianic acid; the new base cotarnine.

1. *Opianic Acid.*—This was discovered some years ago in conjunction with Prof. Liebig. It subsides, on the cooling of the above mixture, as a yellow mass of minute crystals. It is readily obtained perfectly colorless by treatment with hypochlorite of soda; it crystallizes in thin narrow prisms, which are frequently ramified, arborescent, or united in concentric radiating groups; it has a very faintly bitter taste, is slightly soluble in cold water, but much more soluble in boiling water, so that a hot saturated solution solidifies on cooling to a mass of crystals. It melts at 284° without parting with any water; it is not volatile, but creeps up the sides of the vessel so much that it distils over; it burns with flame; its vapor possesses an aromatic odor, and calls to mind that of heated narcotine.

It undergoes a very remarkable change on being submitted to the influence of heat. The melted acid remains soft

and transparent for several hours; it then becomes white and hard, beginning at the surface, but so slowly that a transparent soft nucleus may be found after several days in large fused masses, resembling in this respect arsenious acid. It has now become insoluble in water and alcohol, nay even in dilute alkalies. If water be added to it while it is still clear and amorphous, it becomes milk-white, and on boiling is converted into a white earthy mass, of which extremely little dissolves, and which again separates on cooling in white amorphous flakes. The melted insoluble acid was found on analysis to possess the same quantitative composition as the crystallized. The explanation of this isomerism will appear subsequently.

The analysis of opianic acid, and of its salts of silver and lead afforded for the crystallized acid the formula $C^{20}\ H^{8}\ O^{9}+HO$; in the salts the water is replaced by 1 atom of base. The atomic weight of the anhydrous acid is 2502.23.

Opianic acid forms with barytes, oxide of lead and oxide of silver, readily-soluble salts, which crystallize well, and part with water of crystallization by exposure of heat.

2. *Opianic Ether.*—This body could not be obtained by acting with muriatic acid gas on a solution of opianic acid in alcohol, but it is readily obtained by employing sulphurous instead of muriatic acid. It crystallizes on evaporation of the concentrated solution in minute colorless prisms, united into bundles and spheres. It possesses no odor and scarcely any taste; it is insoluble in cold water; when heated with it, it melts at about 212° to a clear heavy liquid, which on cooling solidifies to a white radiately-crystalline mass, with considerable contraction; it sublimes. Boiled for some length of time in water, it gradually dissolves, being converted into alcohol and opianic acid; this is very rapidly effected by caustic potash. The analysis confirmed its being of the oxide of ethyle $=C^{4}\ H^{5}\ O + C^{20}\ H^{8}\ G^{9}$.

3. *Opiammon.*—This is a product of the metamorphosis of the opianate of ammonia; it forms on the evaporation of

a solution of this salt. The conversion is completely effected on heating the dried saline mass cautiously and equally to somewhat above 212° as long as ammonia is given off. At last it is converted into a pale lemon-yellow powder, which is opiammon. In its perfectly pure state it is probably colorless; it appears crystalline under the microscope. It is entirely insoluble in water, but when heated with water, to 302°, it forms a clear solution, and on cooling opianic acid crystallizes from a solution of opianate of ammonia. Opiammon melts readily and creeps up the sides of the vessel, but is not volatile. It is not altered by dilute hot acids.

From the results of analysis its composition may be expressed by the empirical formula $C^{40}\ H^{17}\ N\ O^{16}$. It originates therefore by the separation of 4 atoms of water and 1 equiv. of ammonia from 2 atoms of opianate of ammonia.

4. *Xanthopenic Acid.*—This is a nitrogenous acid, which is formed by the action of alkalies on opiammon; it is characterized by the yellow color of its salts. A solution of caustic potash does not at first act upon the opiammon, but it soon begins to dissolve, with a uranium-yellow color and with contemporaneous disengagement of ammonia. On boiling till this has ceased, a yellow solution is obtained of xanthopenate and opianate of potash. The xanthopenic acid is precipitated by muriatic acid in yellow flakes, and can be filtered before the opianic acid has time to crystallize from the hot liquid. In this reaction three-fourths of the nitrogen of the opiammon are expelled. Xanthopenic acid is a lemon-yellow crystalline powder; it melts and dissolves in alkalies with a uranium-yellow color. Heated with soda-lime it disengages ammonia. Its composition has not yet been ascertained.

5. *Opianosulphurous Acid.*—This compound is formed by the action of sulphurous acid on opianic acid; the latter is dissolved in large quantities by the hot aqueous solution of sulphurous acid, without separating or cooling. The so-

lution has a very peculiar bitter taste, and leaves behind for a long time a peculiar sweetish after-taste. Carbonate of lead and barytes dissolve in the liquid, and form beautiful crystalline salts, characterized by their lustre. It reduces selenium from selenious acid, and gold from perchloride of gold.

When the solution of opianic acid in sulphurous acid is evaporated at a gentle heat, the new compound is left as a crystalline transparent mass. It is perfectly free from smell. When treated with water it becomes milk-white, and acquires a strong odor of sulphurous acid. The separated white substance is unaltered opianic acid: this decomposition however is only partial.

The analyses of the lead and barytes salts have shown that a composition of this body may be expressed by the formula $C^{20}\ H^{6}\ O^{7}\ 2SO^{2} + HO$. The atom of water represents the bases in the salts. The author will subsequently return to the consideration of its peculiar composition.

6. *Sulphopianic Acid.*—This is an organic compound with sulphur, which is generated by the action of sulphuretted hydrogen gas on opianic acid, dissolved in water at a temperature of 158°. A gradually increasing turbidness results, which appears like precipitated sulphur; the body however which separates, and into which the whole of the opianic acid is converted, is the new compound. The gas must be passed through several days before the action is complete. The sulphopianic acid separates as a yellowish powder. On heating the liquid to boiling, the precipitate melts to a pale yellow clear oil, which sinks to the bottom and solidifies on cooling.

In this state the sulphopianic forms an amorphous, transparent, sulphur-yellow mass; below 212° it becomes soft, and at that temperature entirely liquid; heated more strongly, it is decomposed, giving off voluminous sulphur-yellow vapors, which condense into minute yellow acicular

crystals, which are readily soluble in alcohol. It burns with flame and with the odor of sulphurous acid. It is entirely soluble in alcohol, with a yellow color: if it had been melted, it is again obtained, even on spontaneous evaporation, in an amorphous state; but if the temperature had been so arranged at its formation that the precipitate could not become soft, it separates from the alcohol in minute yellow prisms; it undergoes therefore a similar metamorphosis at its melting point as the opianic acid. It is dissolved by alkalies with a yellow color, from which it is precipitated by acids in the form of a yellow emulsion, and without any disengagement of sulphuretted hydrogen. After some time however these solutions contain an alkaline sulphuret. In their unaltered state they afford with salts of lead and silver brownish-yellow precipitates, which are converted at a boiling heat into black sulphurets.

Sulphopianic acid is constituted according to the formula $C_{20}H^{8}O^{7}S^{2}$. It may therefore be regarded as hydrated opianic acid, in which 2 atoms of oxygen have been replaced by 2 atoms of sulphur; its formation is therefore quite simple.

The existence and composition of these bodies derived from opianic acid appear to afford some explanation respecting the true nature of this acid. The elements of 2 atoms of water are evidently removed from its composition by the influence of sulphurous acid and sulphuretted hydrogen, equivalent quantities of which take their place. To the author it appears most simple to admit, that besides the atom of water substitutable by bases, these 2 atoms of water are contained likewise as such in the opianic acid in a state of combination, in which they cannot be separated by bases, just as little as the organic body contained in benzoe-sulphuric acid separates from the sulphuric acid on its union with bases. The author regards opianic acid as a conjugated acid, the copula in which consists of 2 atoms of water,

which can be replaced by other copulæ, as sulphuretted hydrogen and sulphurous acid. Opiammon must then be considered as belonging to this series; it is a conjugated combination of 2 atoms of opianic acid, 2 × ($C^{20}H^6O_7$,) with 1 equiv. ammonia and 2 equiv. water, *i. e.* a combination of 1 atom of opianic acid with water for copula, and 1 atom of opianic acid with ammonia for copula. This view will be rendered intelligible by the following formulæ. The excluded atom of water is that which is replaceable by bases:—

Opianic acid	$= HO + (C^{20}H^6O^7 + 2HO.)$
Opianosulphurous acid	$= HO + (C^{20}H^6O^7 + 2SO^2.)$
Sulphopianic acid	$= HO + (C^{20}H^6O^7 + 2HS.)$
Opiammon	$= (C^{20}H^6O^7 + 2HO) + (C^{20}H^6O^6 + NH^3.)$

The latter might also be regarded as biopianate of ammonia = $(NH^4O + C^{20}H^6O^7) + (HO + C^{20}H^6O^7.)$ But it certainly is not a salt.

If this latter view is correct, it becomes highly probable that narcotine itself likewise belongs to this series, and is a body of analogous composition to opiammon, in which opianic acid may be admitted as pre-existing in the above sense.

The melted and insoluble opianic acid is probably a totally different body, but isomeric with the crystallized opianic acid, and has probably originated from the opianic acid having assimilated the elements of the 2 atoms of water under the influence of heat. If it consists of two bodies, as the microscopic examination tends to show, these together possess, as the analysis indicates, the composition of the crystallized opianic acid.

(To be continued.)

ART. XXXIV.—PREPARATION OF THE PERCHLORIDE OF IRON.

By M. Gobley.

Sesquichloride or perchloride of iron exists in the anhydrous state and in the state of hydrate.

To obtain the anhydrous perchloride there are two processes. The first consists in placing in a luted glass or porcelain tube iron hammerings, and inserting the tube in a furnace; the tube should project some distance beyond the furnace. When the apparatus is thus arranged, that portion of the tube where the iron is placed is heated to a temperature below red heat, about 752°, and a current of dry chlorine is then passed through by one of its extremities. The gas is rapidly absorbed the iron becomes incandescent, and gives off abundant vapors of sesquichloride, which condense in the cold portion of the tube projecting beyond the furnace, in the form of laminæ of dark violet color, and possessed of a metallic lustre.

The second process consists in saturating commercial muriatic acid with dry or moist hydrate of the peroxide of iron. The solution is first effected at the ordinary temperature, then assisted by a gentle heat; and when the acid no longer takes up any oxide, the liquid is filtered, evaporated to dryness in a porcelain capsule, taking care to moderate the heat and to stir constantly. The product of this operation is transferred into an earthen retort, and heat gradually applied, taking care not to place any fire near the dome of the retort. Aqueous vapors are first disengaged; when they have ceased a cork is adapted loosely to the aperture of of the retort, and the fire is then raised, so that the bottom of the retort is nearly red-hot towards the close of the operation. The anhydrous perchloride sublimes on to the

dome, and into the neck of the retort; when this has cooled sufficiently, it is broken, the chloride removed and transferred immediately into the bottles destined to receive it.

Although the last of the two processes described is the best and most easy of execution, there are many pharmaceutists who are prevented from following it, and the medicinal perchlordide of iron of the Codex is that which is obtained by the moist way. Several processes have been proposed for the preparation of the hydrated perchloride of iron. The Codex prescribes dissolving red oxide of iron in hydrochloric acid and evaporating the solution to dryness over the water-bath. This process is bad, for the product always contains, however carefully the evaporation may have been made, a large proportion of insoluble oxychloride.

Thénard, Berzelius and Orfila advise, in their works, dissolving sesquioxide of iron in hydrochloric acid, evaporating the solution to a syrupy consistence, and allowing to cool. The perchloride is deposited in the form of beautiful red crystals, which deliquesce with the greatest facility.

M. Béral proposed preparing it by dissolving precipitated sesquioxide of iron in hydrochloric acid, first cold and then over a water-bath; the solution is transferred into a porcelain capsule, and evaporated at a gentle heat to a syrupy consistence; when arrived at this point, the capsule containing the perchloride of iron is placed by the side of another containing caustic potash or lime, and the whole covered with a bell-glass. The alkali absorbs both the water and the hydrochloric acid, so that in ten to fifteen days the chloride forms a dry, confusedly-crystallized mass which is then transferred into a bottle under the bell-glass, to prevent the salts deliquescing in the air. This process succeeds very well, but it requires much time, and gives a chloride which is not of constant composition, because it retains variable quantities of water, owing to the method of its preparation.

M. Morh has recently proposed for preparing perchlori-

of iron, dissolving hæmatite by digestion in commercial hydrochloric acid, and boiling towards the end of the operation. The liquid is allowed to clarify, is then evaporated to the consistence of a liquid syrup, and placed well covered, in a cold situation, for instance in a cellar, where it begins to crystallize after some days, and continues to do so for some weeks; the mother-water is decanted and the crystals preserved. M. Mohr analysed the crystals prepared in this manner, and found them to contain 12 atoms of water; he has consequently assigned to it the formula $Fe^2Cl^3 + 12HO$.

M. Fritzsche, who undertook a fresh investigation in order to determine the proportion of water contained in the chloride of M. Mohr, found that this chloride gave very different results on analysis with respect to the quantity of water, which is equally the case with those obtained by the process described by Orfila, Thénard and Berzelius, and that it was impossible to decide whether it contained 10, 11 or 12 atoms of water; with 10 atoms it should contain 35.92 per cent., with 11, 38.15, and with 12, 40·22. According to the same chemist, on leaving the preceding chloride under a bell-glass with sulphuric acid, the crystals are again convertrd into a thick liquid, which gives rise to other crystals, containing from 21 to 23 per cent. water; 5 atoms would require 21.9 per ct. According to M. Fritzsche, the same crystals are obtained by fusing the chloride with 10, 11 or 12 atoms of water and evaporating until a drop solidifies on cooling, and then adding a few drops of concentrated hydrochloric acid before placing it aside to cool.

M. Fritzsche has been led by his experiments to admit the existence of two hydrates of the perchloride of iron perfectly crystalline, between which there is no other crystalline combination.

It will be seen from the above that the processes which have been described for the preparation of the hydrated

perchloride of iron are very numerous; but it may be said that neither admits of the perchloride being obtained of a constant composition, in a short time, entirely soluble and capable of long preservation. The principal cause of the easy alteration of the chloride of iron prepared by the processes described, appears to be the large quantity of water which the preparation retains; for instance, that of M. Béral, which contains least, affords, shortly after its preparation, a perceptible deposit of oxychloride when dissolved in water.

Induced by M. Soubeiran to find out a practical process which would allow of obtaining in a short time a perchloride of iron completely soluble, and of a constant composition, I believe I have succeeded by submitting the solution of sesquioxide of iron in hydrochloric acid to the two following conditions of evaporation:—1st, evaporation at a temperature not exceeding 212°, and 2nd, evaporation in pefectly dry air.

After several experiments I stopped at the following process:—Pulverized hæmatite is introduced into a stoppered flask, and a quantity of pure concentrated hydrochloric acid poured over it; there should be an excess of hæmatite; it is then agitated. The two bodies soon react on each other, forming water and perchloride of iron, with disengagement of heat; when the first action is passed over, the flask is placed near the fire and shaken frequently; after several hours contact it is allowed to subside, and is filtered. The filtered liquid is received in a porcelain capsule, which is placed either on some sand heated by steam or on the head of an alembic, taking care to interpose a piece of flannel between the alembic and the capsule, and to maintain this in its position by means of a piece of string. The apparatus should be so arranged that the steam is conveyed by a long tube into a vessel full of cold water; for it is essential to the success of the operation that no aqueous vapor should circulate around the capsule; since, when the

liquid is evaporated in the atmosphere charged with humidity, it is decomposed when the salt has reached a certain degree of concentration, hydrochloric acid is disengaged, and sesquioxide of iron precipitated. It must be stirred with a glass spatula during the whole time of evaporation, which is continued until the liquid no longer disengages any perceptible vapors of hydrochloric acid, and a drop solidifies on cooling. When it has reached this point, the chloride is poured into perfectly dry phials, provided with good corks; but from this chloride becoming very hard, it is difficult to remove it from the phials. To obviate this inconvenience, M. Soubeiran, who had the kindness to repeat the process, advises its being poured on to a slightly-greased plate, which is immediately covered by another plate, and joined to the first by means of a little luting. After four-and-twenty hours the plates are separated, the chloride broken into pieces, and immediately transferred into well-dried bottles, which should be corked with great care.

The perchloride of iron, prepared in this manner, possesses a dark yellowish-red color, no odor, but a very styptic taste. It is excessively and entirely soluble in water; the solution, which is of a beautiful golden yellow, preserves for an indefinite length of time, exposed to the air, without becoming turbid; it is likewise very soluble in alcohol and ether. Exposed to the air, it rapidly absorbs moisture, which at first it solidifies, but subsequently it deliquesces, and it is therefore necessary to keep it in dry and well-closed bottles. This chloride has the great advantage of keeping for a long time without being decomposed, owing without doubt to the small quantity of water it contains; thus the samples which I possess are as good at present as they were eight months ago, immediately after their preparation.

To ascertain the quantity of water which it contains, I took four samples of the chloride, one of which had been prepared by M. Soubeiran and the other three by myself, 1

grm. of each was decomposed by a gentle heat, and the decomposition assisted by adding several times a few drops of nitric acid. That prepared by M. Soubeiran left 0.393, and the three others 0.392, 0.385, 0.380. The mean of these four quantities is 38.75 which represent 26.86 per cent. iron, which require 52.58 chlorine to form sesquichloride. 100 parts of the chloride consist therefore of—

Iron	26.86
Chloride	52.58
Water	20.56
	100.00

This chloride contains about one-fifth of its weight of water, or somewhat less than 5 atoms which require 21.9 per cent. It corresponds to the hydrate with 5 atoms of water of M. Fritzsche.

The process which I propose has therefore the great advantage of affording an entirely soluble chloride of a constant composition, and susceptible of long preservation, which hitherto had not been attained.—*London Chem. Gaz. from Journ. de Pharm.*

ART. XXXV.—ON THE HADSHY OF THE TURKS.

By M. Landerer.

This beverage is derived from *Cannabis sativa*. The relations of climate however produce a far more considerable developement of the narcotic principle.

The mode of preparing the hadshy is as follows :—When the hemp plants have blossomed, and have begun to form fruit, the delicate shoots, leaves and unripe fruit are pressed,

and set into vinous fermentation by means of a syrup from sweet fruits, or rather are thrown into the fermenting liquid. The fermented liquid is poured into flasks, and frequently colored red with *Coccus Cacti* or *Coccus Ilicis*, and then used as a spirit.

Another kind of hadshy occurs in the form of an electuarium, which has very quick but transitory action on the human frame.

It is prepared in the following manner :—Dates, figs, currants and other sweet fruits are pressed to a paste, mixed with fresh hemp aud poppy-leaves, and formed into balls, which are moistened from time to time with spirits, and preserved in a cool place until they diffuse a strong narcotic odor, which already produces intoxicating effects. This mass is now boiled with butter and oil of sesamum, and the products strained from the residue, poured into tin forms, and placed aside to cool. This is the hadshy of the Arabs, such as is sold in the bazaars of Cairo. It has a greenish-yellow color, a very rancid taste, and is void of smell.

M. Landerer digested a portion of this hadshy with dilute muriatic acid, and another portion with absolute alcohol. The liquids obtained were yellowish-green, and possessed a very bitter taste. The acid liquid gave voluminous precipitates with alkalies and likewise with tannic acid, which were of a very bitter taste. A concentrated solution of this substance rubbed on the eyelid of a cat, produces in a few minutes a very perceptible dilatation of the pupil ; it has likewise the same effect on the human eye. When the hadshy is mixed with water and submitted to distillation, the product obtained has a somewhat bitter taste and a faint odor of herbs. It may be drunk without producing any ill consequences.—*London Chem. Gaz. from Buch. Rep.*

XXXVI.—ON THE CRAJURU OR CARAJURU AND CHICA, A NEW RED TINCTORIAL SUBSTANCE FROM SOUTH AMERICA.

By J. J. Virey.

The leaves of various plants contain, besides the ordinary elements of vegetable organization, peculiar coloring principles; thus, for instance, blue leaves are frequently filled with indigo, as is observed in *Polygonum*, *Isatis*, *Nerium*, *Pergularia*, *Hedysarum*, *Galega*, &c., for even the cows which feed upon them sometimes give blue milk.

Other leaves naturally become red, owing to certain properties peculiar to their juices, but especially to the action of heat and light. These kinds of vegetables, generally astringent or acid, are more frequent in southern countries, where they develope their red tints to a greater extent at an advanced period of vegetation, as in autumn; this is the time for obtaining peculiar red dyes. We might enumerate a long list from among the *Rubiaceæ*, *Rosaceæ*, *Leguminaceæ*, &c., even of our temperate climate, but the richest tinctorial products are peculiar to intertropical regions.

M. de Humboldt has described in the 'Annales de Chemie et Physique,' (vol. xxvii. p. 315,) under the name of *Chica*, a vegetable product of a brick-red color, obtained by macerating in water the leaves of *Bignonia chica*, a shrub of the family of the *Bignoniaceæ* from equinoctial America.

As we have obtained from Para in Brazil, under the denomination *Crajuru* or *Carajuru*, a substance not only analogous in its physical and chemical characters to the *Chica*, but of a red brown violet tint, much more beautiful or rich, and like vermillion, whilst the other appeared duller and much inferior, it may be useful to give fresh de-

tails about this product, which has been imported to be tried in dyeing.

The *Crajuru* or *Carajuru* (*Carucuru* according to others) is a kind of powder or fecula, in pieces somewhat light, inodorous, insipid or slightly bitter, not soluble in water, but soluble in alcohol, ether and the oils and fats, without being completely resinous, burning with a flame, but leaving a quantity of gray cinders. It is wholly dissolved by alkalies, and acids precipitate it without greatly altering its color, if they are not concentrated.

The *Chica* of M. de Humboldt came from the neighborhood of the Orenoko, near Rio Meta; but the *Crajuru* seems to be the kind mentioned by Hancock, from Guiana, as being purer, and sent in the form of balls, enveloped in the bark of trees or palm-leaves. Indeed, the *Crajuru* is of an intense violet tint, with a coppery lustre when rubbed on a hard body. MM. Boussingault and Rivero also state that it is advantageously used in dyeing.

It would therefore appear that it is not only the *Bignonia chica*, but perhaps other kinds of shrubs of the same genus, which afford the finest *Carajuru*. The Galibis, and other savage tribes, boil the stalks and leaves of these *Bignoniæ*, which are of a red tint at their advanced period of vegetation, to obtain it. It is passed through a sieve made of the bark of a tree, and the fecula is well washed in water, and then exposed to the sun to dry.

The natives only use the *Chica* or the *Crajuru* for painting the skin, either as a defence against humidity and the bites of insects, or as a brilliant ornament, and in order to render themselves formidable in their wars. For this purpose they pound the *Chica* or *Crajuru* with a fat liquid, as the bitter and yellow oil of the fruit of the carapa, (*Xylocarpus carapa*,) made fragrant with the balm aracouchini (*Amyris heterophylla*, Wild.) Other travellers assert that the aborigines prefer the fat of tortoises, which is green, or still better, the musky fat of the *Crocodilus acutus*, for

making a kind of *Chica* pomatum, and anoint their skin with it.

The *Crajuru* now brought into Europe must furnish a rather strong and beautiful dye, the brilliancy of which appears quite superior to that of Orleans.*

Lond. Chem. Gaz.

ART. XXXVII.—ON TWO KINDS OF VEGETABLE WAX, FROM BRAZIL.

By M. Sigaud.

The first kind of wax known under the name of *Carnauba*, is afforded by a palm which grows in abundance in the northern provinces of Brazil, especially in the province of Ceara. It forms a thin layer on the surface of the leaves of the tree. The cut leaves are dried in the shade; scales of a pale yellow very soon separate, which melt when heated, and give a mass of true wax, the sole fault of which is that it is rather brittle.

The first samples of this wax were sent by the governor of Rio Grande to the Count de Galveas, who in his turn sent them to Lord Grenville. Mr. Brande published an analysis in the Phil. Trans. for 1811. Mr. Brande endeavored to discover a method of bleaching this wax, but without success. He was more fortunate in some experiments of manufacturing it into candles; his experiments

* The drink called *chica*, which is so much used among the people of South America, must not be confounded with the subject of the present notice. This drink, in fact, is prepared with pods of algaroba, (*Mimosa algaroba*,) which are nearly as sweet as the carouba of the *Ceratonia siliqua*, and with the bitter stalks of the *Schinus molle*. It is said that old women are employed to chew these *Algarobæ* and the *Schinus*, and then to spit them into a vessel; water is added; the whole soon ferments, and affords a kind of intoxicating beer.

were repeated at Rio Janeiro with a very satisfactory result, so that at present the substance has become an object of commerce. It meets with a ready sale in the market of Rio Janeiro, and vessels go even as far as Ceara in order to obtain cargoes of it.

The second kind of wax, known in the country by the name of Ocuba wax, is derived from a widely-distributed shrub in the province of Para, and also appears to be found in French Guiana. This shrub, which is rather bushy, scarcely attains the height of thirty hands; it grows in the marshy lands, and abounds on the shores of the Amazon river and its tributaries. It affords a fruit of the form and of the size of a bullet, containing a nut covered by a thick crimson pellicle, which imparts a red tint to water, and affords an excellent purple color. After its first washing the nut retains its black color; it is piled in heaps, ground and reduced to a pulp; it is then boiled for a certain time, in which operation it affords a wax, which floats on the surface of the vessel. This crude wax greatly resembles bees' wax; it has also much analogy with the wax Ibucuiba, which M. de Humboldt described on his return from America, and of which I have preserved a sample for the sake of comparison. Submitted to a process of purification, the Ocuba wax acquires a brilliant white, and is used for candles; it affords a light similar to that of gas. At Belem, the capital of Para, this wax has long been used for the manufacture of cheap candles. 16 kilogrms. of seed afford 3 kilogrms. of wax. These trees are so numerous in Para, along the banks of the Amazon river, that in the months of January, February and March the entire population is occupied in gathering the seed or fruit, as they are occupied in Europe during the months of September and October in getting in the vintage.

Ibid, from Journ. de Pharm.

At a Public Commencement of the PHILADELPHIA COLLEGE OF PHARMACY, held Thursday evening, April 25th, the degree of *"Graduate in Pharmacy"* was conferred upon the following gentlemen, pupils of the Institution :

	Subject of Thesis.
Daniel S. Jones,	Arum triphyllum.
Jacob S. Smith,	Aralia nudicaulis.
Joshua S. Jones,	Cimicifuga racemosa.
Caverly Boyer,	Asclepias tuberosa.
Andrew McKim,	Cypripedium pubescens.
Edward Donelly,	Phytolacca decandra.
Silas Hough Wentz,	Erigeron philadelphicum.
Alfred B. Taylor,	The Air Pump.
Thomas S. Wiegand,	Aristolochia reticulata.
Thomas Estlack, Jr.,	Spigelia marilandica.
Robert Coulton Davis,	Cantharis vesicatoria.
George H. Mitchell,	Podophyllum peltatum.
Robert C. Brodie,	Copaiba.

After which an Address was delivered by PROFESSOR BRIDGES.

MISCELLANY.

Employment of Electricity in cases of poisoning with Strychnine.—M. Duclos has instituted a remarkable series of experiments on rabbits, dogs and guinea-pigs. He poisoned these animals with strychnine and brucine, and then electrified them; and found that, on application of the negative electricity excited by means of an electrical machine, the symptoms of poisoning subsided, and the animals were saved; the positive electricity, on the contrary, increased the muscular contraction produced by the posion, and hastened death.

Animals which had been poisoned with arsenious acid could not only not be saved by electrifying them, but were, on the contrary, killed sooner, whether positive or negative electricity was employed.—*Chem. Gaz. from Buchner's Rep. für die Pharm.*

Efficacy of Tannic Acid in Poisoning by Hemlock.—Hitherto tannic acid, or the decoction of galls, or of any astringent vegetable, has been considered of great service in cases of poisoning by strychnine and brucine. M. Meyer had recently occasion to observe the great efficacy of tannic acid also in a case of poisoning by hemlock. Four children had eaten a large root of the water hemlock, *Cicuta virosa*, L. One child died almost immediately; to the other three sulphate of zinc was first administered in large doses to produce vomiting, which was assisted by draughts and frictions to the stomach, after which cold applications to the head, horse-radish and mustard plasters were used, clysters of vinegar administered, the cold extremities rubbed with flannel and warmed, upon which a decoction of gall was administered in frequent doses and with the greatest success, for the alarming symptoms gradually disappeared, and the three children were perfectly restored after five days.—*Ibid.*

Extract of Hops and Oil of Hops for the Preparation of Beer.—Prof. Redtenbacher draws attention to the fact, that of the constituents of the hop, the bitter substance (lupuline), the astringent substance, and the aromatic oil of hop, are the only substances which enter into the composition of beer. The aqueous extract of hop, prepared by boiling, may easily be preserved, and 12 lbs. of it correspond to 1 cwt. of hops; it contains the first two constituents. The oil of hops, which in the

usual method of employing the hop is volatilized for the greater part, may be obtained by distillation with water; 1 cwt. of hops would afford 3 oz. If, then, in brewing, extract were to be employed instead of hops, and the oil added when the beer is filled into the fermenting vats, the brewer would save all the expense of store-room for hops, avoid all the risks of the hop trade, could not easly be cheated, would be able to determine with greater certainty the quantities necessary to be added, and would require less hops, from the saving effected in the quantity of oil. The expense of obtaining the extract and oil from 1 cwt. of hops would not amount to any great deal, and by this a fourth of the hops would be saved on account of the oil; so that when the price of hops stood at 120 florins per cwt. there would be a clear saving of 25 florins on the hops alone. A butt of beer would require about 2 oz. of extract and 11 grs. of oil.—*Polytech. Central Blatt.*

[Another advantage of this extract, should it be found to answer, would be that the English brewer might import extract from America, from which country it is impossible to import hops, owing to their bulk.—*Chem. Gaz.*]

Preparation of the Red Iodide of Mercury (Iodine Red) as a Paint.—M. Heller recommends the following method for obtaining a good iodine red. Commercial crystallized iodide of mercury is pounded and dissolved in a boiling solution of sal-ammoniac (1 part of sal-ammoniac to 1½ water). The iodide of mercury is conveyed into the boiling solution as long as any dissolves; the hot solution is then decanted and allowed to cool, upon which the iodide of mercury again separates. It is deposited in very beautiful purple-red crystals on the sides of the glass. Frequently these crystals appear at first of a pale yellow, owing to the dimorphism of this salt; but soon after the cooling of the liquid they become as beautifully red as those which directly separate of this colour. If the solution of sal-ammoniac was too concentrated, the sal-ammoniac is frequently deposited in white crystals along with the red ones; this does no harm, as they may easily be separated by washing with water, to which they dissolve, while the latter are insoluble. When the cold liquid has been allowed to stand for half a day, the separation of crystals has terminated; the liquid is then poured off, the crystals are washed, separated by means of a glass rod from the sides of the vessel, and dried. They are not pulverized, but are preserved whole, and whenever wanted for use a small quantity is ground up with gum or oil. The colour of the crystals is not so yellowish-red as the commercial powder, the well-known iodine-red, but more of a purple-violet. The bright red colour is acquired when the crystals are re-

duced to powder; it is the brighter, *i. e.* has a less violet tint, the finer it is pulverized.—*Chem. Gaz. from Polytech. Central Blatt.*

Adulteration of the Neutral Chromate of Potash.—According to the observation of C. Erdmann of Leipsic, there occurs at present in commerce a chromate of potash of English manufacture, which is nothing less than chromate of soda, sophisticated moreover with sulphate of soda. Now, chromate of soda, when crystallized at a temperature below 86°, contains 53 per cent. water, while the potash salt is entirely free from water under all circumstances. The spurious chromate of potash in question has given rise to numerous complaints respecting its want of efficacy, and has proved indeed to contain a considerable amount of water. The adulteration is evidently not unintentional, and is based on the chromate of soda crystallizing with this amount of water at a low temperature, and then possessing the form of sulphate of soda. The chromate of soda is obtained at a higher temperature as free from water as the potash salt: and if the soda salt were pure, there would then be a gain in the amount of chromic acid with this substitution, from the equivalent of soda being lower.—*Ibid from Pharm. Central Blatt.*

New Salt of Mercury and Quinia.—The combination of oxymuriate of mercury and tincture of bark has been long known as a remedy for the treatment of scrofula and enlarged mesenteric glands, also in the treatment of strumous ophthalmia. This combination is well known to be unchemical, the salt being decomposed by the bark. Mr. R. N. M'Dermott of Dublin, convinced of the value of a combination of the active principle of the barks with salt of mercury—"a combination which, according to the concurring testimony of various physicians, accelerates, in a remarkable manner, the constitutional action of mercurials, was brought to think that a definite compound might be formed in which the bichloride would perform the part of an acid, and the alkaloid quinia form the base, and which would combine the therapeutic value of these two important substances." On trial he found the results were exactly as he had anticipated. He obtained a double salt, a proto-chloride of mercury and quinia, chemically combined. On subjecting it to the strictest analysis, no trace of bichloride could be detected. The intimate combination of the active principle of the bark with mercury in the form just indicated, will, in his opinion, render it less liable to produce the ill effects of mercury on some constitutions, while its efficacy as a general remedy must be much enhanced. He anticipates that the combination of these two agents will rarely fail of producing a happy result in the diseases of the eye generally, but especially when scrofula is present. *Dublin Medical Press.*

Valerianate of Zinc.—This new preparation is extolled by some of the Italian physicians as a very powerful remedy in several nervous affections. It is formed by adding the protoxide of the metal to the vegetable acid to saturation, and then slowly evaporating the solution. It is administered in the form of pill in the dose of one or two grains. In the *Bulletino delle Sc. Mediche* some cases of neuralgia successfully treated by it are recorded.

Chloride of Magnesium.—This has lately been recommended as a saline aperient by Dr. Lebert. It is said to produce no injurious effect whatever on the stomach, and if occasionally it gives rise to any unpleasant sensation, it inconveniences less than most other purgatives. It would also seem to favor digestion since its purgative action is followed by an improvement of the appetite. The mean dose as an aperient is 32 grammes for an adult, and half that quantity for a child of from ten to fourteen years of age.—*Prov. Med. and Surg. Journ., from Gaz. Méd. de Paris.*

Confectio Ferri Composita.—Mr. Heathcote, of Gosport, gives us a a formula, which, he says, is in frequent use in Bath. The "Clinkers" may be readily got at any blacksmith's forge.

Take of Clinker, freed from all impurities and reduced to an impalpable powder - - - - - -	8 ounces
Carbonate of Magnesia - - - - -	½ an ounce
Powdered Ginger - - - - - -	1 drachm

Treacle a sufficient quantity to form the whole into an electuary.

Lond. Medico-Chirurgical Review.

Preparation of Benzoic Acid By Prof. Wöhler.—Pulverized benzoin resin is dissolved, with the assistance of heat, in about an equal volume of highly rectified alcohol, and the solution mixed while hot, but gradually, with so much fuming muriatic acid that the resin begins to be precipitated. The mass is then submitted to distillation. The benzoic acid passes over in the form of benzoic ether. The distillation is carried on as long as the consistence of the mass admits; when it becomes too thick, it is allowed to cool a little, hot water added to it, and again distilled as long as any ether passes over. The water remaining in the retort is, when clear, poured off boiling-hot from the resin; on cooling it deposits benzoic acid, probably derived from benzoic ether.

The product obtained is digested with caustic potash until the whole of the ether is decomposed, finally heated to boiling, and saturated with muriatic acid, when the benzoic acid separates in crystals on cooling.

It appears that the entire amount of benzoic acid of the resin is obtained in this manner; and it may be observed, with reference to the pharmaceutical application, that the acid so prepared possesses entirely the odor of the sublimed acid. Whether the stated proportions of resin, muriatic acid and alcohol are the most advantageous, I am not able at present to say.—*Liebig's Annalen, from Lond. Chem. Gaz.*

Cement for the Teeth. By Ostermaier.—According to Ostermaier, this cement is prepared by mixing 52 parts of chemically pure and finely-powdered caustic lime with 48 parts of pure anhydrous phosphoric acid, obtained by the combustion of phosphorous in dry air; the mixture is rapidly triturated in a mortar.

A sufficient quantity of the powder thus prepared is then introduced into the cavity of the carious tooth; it is strongly compressed, and the surplus is equalised as much as possible, then it is slightly moistened.

It must be observed that this powder can be used only in one or two minutes; consequently, it should be prepared only just before it is used. —*Lond. Chemist, from Jahrbuch für Praktische Pharmacie.*

On the Means of Preventing or Curing the Injuries Caused by a long Decubitis. By Dr. Tott, of Ribnitz.—Besides the means already known and used for preventing ulcerations by decubitis, Dr. Tott makes use of the following mixture, the formula of which is due to the celebrated Mursinna:—

℞. Tincture of camphor
Goulard's vegeto-mineral water } 250 parts.

Mix.

With this mixture the points of the skin which have been rendered red by continued pressure, are washed, and these washings are repeated several times during the 24 hours, taking care to shake the bottle well before pouring out the quantity of liquid necessary for each application.

If, notwithstanding the employment of this mixture, the symptoms remain, and the skin begins to ulcerate, Dr. Tott rubs the wounds with an ointment of lead and zinc, or, again, with the camphorated white rhazes: in the most serious cases he had recourse to tannate of lead, under the following form:—

℞. Recent tannate of lead - - - 12 parts.
Lard - - - - - - - - 30 "

Make a perfectly homogenous ointment.

He applies this mixture three or four times a day.

But the best means which the author prescribes, as well by way of prophylatic for phlogosed surfaces, as for cicatrising those which are already ulcerated, is the creosotic water prepared according to the pro-

portions indicated by Reichenbach (one part of creosote to 80 parts of distilled water.) He employs this water in all cases, except in those where the wound presents a blackish cindery tint, that is to say, where gangrene already exists. In the latter cases, he recommends fomentations with the decoction of yellow quinquina, to which a small quantity of tincture of myrrh has been added, and he sprinkles the wound with a powder composed of camphor and myrrh, or he also applies to the ulcerated surfaces fine cloths covered with a layer of camphorated storax ointment.—*Ibid from Watter und Ammon's Journal.*

Preservation of Pathological Specimens.—M. Pigne announces that a solution of creosote, in the proportion of 4, 5, 6, 8, or 10 drops, according to circumstances, to the litre, or pint and three quarters of water, forms an excellent, and of course very cheap liquor for the preservation of specimens. An entire subject, or any portion of it, kept in the solution of 10 drops, preserves all its physical characters and properties unchanged for an indefinite length of time. Pathological specimens, that have been shrunk and blanched by twenty years' keeping in spirits, are very speedily restored to their original form, size, color, and pliability, by being transferred to the creosote liquor. Portions of blood, pus, urine, &c., may be kept in it, without undergoing any change, and examined at leisure.—*Ibid from Gaz. Méd.*

New Formula for an Agglutinative Plaster. By M. Prestat.

R.	Gummed diachylon plaster - -	400 parts
	White pitch - - - - -	50 "
	Fine Venice turpentine - - -	38 "

Melt the whole at a gentle heat; after liquefaction, add the two following substances, previously reduced to a very fine powder:—

Gum ammoniac - - - -	} 12 parts.
Mastic resin - - - - -	

Mix intimately, then spread in the usual manner on strips of linen.

During cold weather, it is convenient to increase the proportion of turpentine by ten parts, and to add to the mass—

Oil of sweet almonds - - - - - - 12 parts.

This plaster, which M. Prestat has employed for ten years, joins to the advantage of being powerfully adhesive, that of never causing irritation of the skin.—*Ibid from Encyclographie Médicale.*

Formula for a Blistering Plaster. By M. Houdbine.—The blisters prepared by M. Fumouze Albespeyre being very easy of employment, especially for carrying into the country, I was obliged to make some in order to satisfy the demands made upon me. Being desirous of avoiding this species of monopoly, I have long prepared a blistering plaster,

whose action is very prompt and certain. I send you my formula, in order that you may insert it in the *Journal de Chimie Médicale*, if you think it useful to our brethren.

℞.	Purified Burgundy pitch - - -	60 parts.
	Purified resin of elemi - - -	60 "
	Oil of cantharides - - - -	60 "
	Yellow wax - - - - -	125 "
	Cantharides, in fine powder - -	125 "
	Sulphuric ether - - - -	125 "
	Camphor, in fine powder - - -	20 "

I place the finely powdered cantharides in a vessel; I add the ether, cork, and leave in contact for eight days. I then melt, over a gentle fire, the Burgundy pitch, the wax and the resin of elemi, with the oil; I add the cantharides, and keep the mixture in fusion for at least two hours, taking care to stir occasionally: finally, I mix the camphor in very fine powder. I employ for making my plaster cloth waxed on one side only, the plaster adhering to it better than when the surface on which it is spread is smooth. By following this formula, every pharmaceutist may be freed from the necessity of having recourse to another to procure a convenient plaster, and which may be made as easily as any other plaster.—*Ibid from Journ. de Chim. Méd.*

On Solanine. By Dr. Hermann Baumann.—M. Baumann undertook a series of long and interesting experiments on solanine, and the results which he has obtained, as well as those already published by other observers, have led him to the following conclusions:—

1. Solanine is found in the potato.

2. It exists in the stalks and leaves of the potato, as well as in that of most plants of the family *Solanaceæ*.

3. It is met with in greater quantity in the germs, in smaller quantity in the stalks and leaves, and the tubercles contain the least of all.

4. By boiling potatoes in water, the solanine is at least partially eliminated.

5. Wakenroder's method appears to be the best for the extraction of solanine.

6. Solanine forms with the acid salts which are partly crystallisable, and partly amorphous; many of them have a great tendency to be converted, by the contact of water, into acid and basic salts: this effect especially takes place with the amorphous salts.

7. Solanine, as well in substance as in the solid state, acts, even in small doses, in a very energetic manner on the animal organism; but, if it is rejected by vomiting, it does not leave any bad consequences.

8. It should not be ranked among the alkaloids, which act in a lethal manner, although in certain circumstances it may be so.—*Ibid from Ibid.*